TECHNOLOGY DEPT.

AMERICAN MACHINIST

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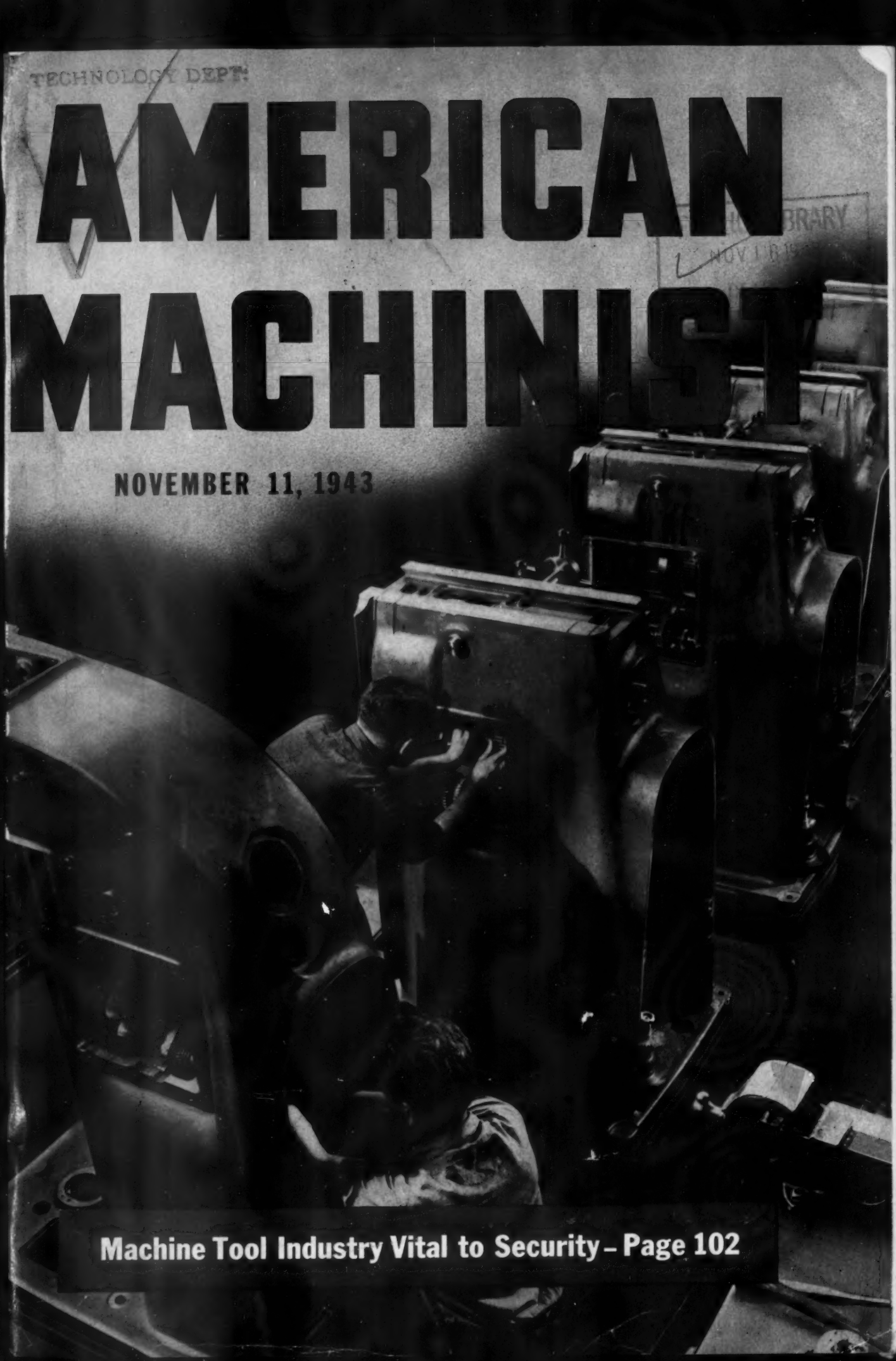
NOVEMBER 11, 1943



Machine Tool Industry Vital to Security – Page 102

R v.87[6] N-D 1943

1200 HORSEPOWER Rides On 6 MILLIONTHS of an inch

HOW HEALD ENGINEERING SOLVED A WARTIME PROBLEM

An army travels on its stomach, but our bombers and fighters do literally fly on their bearings. Aircraft master rod bearings, therefore, are tremendously important . . . failure must not occur . . . consequently specifications are rigid, so rigid that finishing presented a pressing wartime problem to the manufacturer.

Surface finish was of primary importance — was vital for bearings to stand up continuously under the merciless buffeting of 1200 and more whirlwind horsepower. Six microinches, the specifications called for, six millionths of an inch. Design, too, specified a very difficult contour bearing surface, with tapers at either end and a straight section between. And accuracy also had to be close, to .0002".

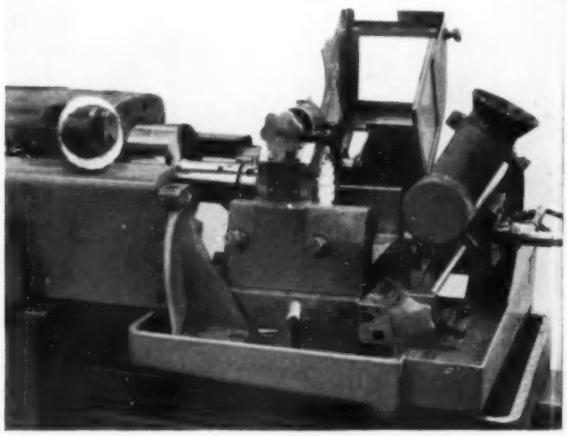
HEALD ENGINEERING was called in . . . and solved the problem. This was a special Heald Bore-Matic arranged with a cam operated contour boring head for boring straight and tapers in a single uninterrupted cut . . . with ingenious refinements in machine design which so completely reduced vibration and thermal expansion that ultra finishes of 4-6 microinches could be produced. Today, a total of 19 Heald Bore-Matics are in production on these bearings in one plant alone.

Have you a wartime problem or do you need assistance in post-war planning? If it involves precision finishing, HEALD ENGINEERING is available, now, to help you.

The HEALD Machine Co., Worcester Mass., U. S. A.

Silver bearings of this type have done much to keep aircraft flying longer, fighting longer. For ultra precision, bearings are borized — to .0002" accuracy, 6 microinches finish.

Precision plus production in finishing aircraft bearings were both achieved with the development of the specially arranged Heald No. 47A Bore-Matic shown below. Machine features include a special contour boring head for boring straight and taper bearing surfaces in the same cut; many design refinements for obtaining surface precision of 4-6 microinches. The Bore-Matic handles both full round and split bearings.



For More Precision Faster, bring your problems to Heald

Tech

TECHNOLOGY DEPT.

American Machinist

November 11, 1943

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AMERICAN MACHINIST —chips

Old Timer . . . Many of you know that Ferracute Machine Company recently celebrated its 80th Anniversary. Congratulations are certainly in order.

Marking the event was an historical brochure covering everything from the founding of the Company to the present time. In helping to prepare it for Ferracute, The Cowan Advertising Agency wrote us for a copy of the earliest advertisement the Company had placed in *American Machinist*. They already had one that appeared in an 1885 issue.

Records of those days have long since gone with the wind, so it evolved on a member of our Research Staff to dust off our ancient bound volumes and start ploughing through the issues prior to 1885, examining each and every ad.

As our willing worker quietly went mad digging for the name "Ferracute", we browsed through one of the volumes and were struck by the amazing progress made by technical advertising during the past 60-odd years. Most of the early ads were small, all black and white and grouped in a dizzy array on the pages. In some it took close reading even to find the name of the advertiser.

Compare that with today's hundreds of full pages and spreads in a variety of colors, attractively presented, full of interesting reading and helpful facts. Some improvement!

o

Early Inventions . . . *Some time ago we commented on the start of Allis-Chalmers' (in their* Electrical Review*) most interesting series on the 19 basic U. S. inventions.*

The second installment, featuring Transportation, comes to hand. It features: Fulton's Steamboat, 1807; Westinghouse's Air Brake, 1869; Wright Brothers' Airplane, 1906; Goodyear's Vulcanized Rubber, 1844; Burton's Oil Cracking, 1913.

All of them either products made in Metal-Working plants, or made possible by machinery produced in Metal-Working plants.

Coming Inventions . . . Hopping, skipping and jumping to the present day and the post-war period, we bring to your attention what was brought to our attention by a recent article in *Advertising and Selling* by Arthur P. Hirose, Director of Market Research and Promotion, McCall Corp. This authority on "the hand that rocks the cradle and builds the home" gives 115 specific suggestions for post-war product and home improvements. A few of those which should interest Metal-Working are:

KITCHEN—A *refrigerator* with a more shallow food compartment, specialized care of fruits and vegetables, easier way to remove a few ice cubes at a time, way to freeze good ice cream. A *range* with complete flexible heat intensity, visible electric range heat indication, separate broiler and oven compartments on inexpensive models, no-stoop-to-look compartments.

A better *dishwasher* for Mrs. Middle-class. Better *pots, pans* and *utensils* that will be easier to clean and more efficient to use. Stain-resistant *knives* that can be kept sharp. An easy-to-use *fruit juice extractor.* An open-all *can opener;* easily-operated *ice crusher;* a built-in *motor* to which one could attach any number of appliances.

LAUNDRY—Better *washing machines,* with a shorter cycle of washing and a separate dryer. An *ironing machine* that doesn't take a Houdini to work it. A lighter, safer *electric iron.*

LIVING AND DINING ROOMS—Non-breakable *springs* in upholstered furniture. *Lamps* that could be moved but don't have to have cords. Summer *furniture* that is collapsible but comfortable.

BATHROOM, GARDEN AND GENERAL—Door in *medicine cabinet* that slides and doesn't open in your face. Permanently bright *faucets* and *fittings.* Easily adjusted *shower spray. Lawn mower* that is self-sharpening, permanently oiled and motor powered. A *lawn edger* that works. A *heating system* that doesn't make the house dirty. Silent *electrical appliances.*

And so on. We'd like to remind production men that as you were prime factors in converting to war, you will also take a front seat in the peacetime change-back period. Lots of ideas here, gentlemen, lots of opportunities. Something to turn around in the back of your mind as you turn out the weapons of war.

o

It's Being Done . . . *Don't know why we keep harping on inventions, but the news of the day seems to hang together that way.*

American Radiator and Standard Sanitary Corp. follows the line of automotive thinking by saying that their first post-war products will probably be in the 1942 mode; newer and better ones to follow.

Walter H. Gardner, Gen. Sales Mgr. of Keystone Steel and Wire Co., says there are some 1500 new products developed and used in wartime production that have not as yet been released for consumer use.

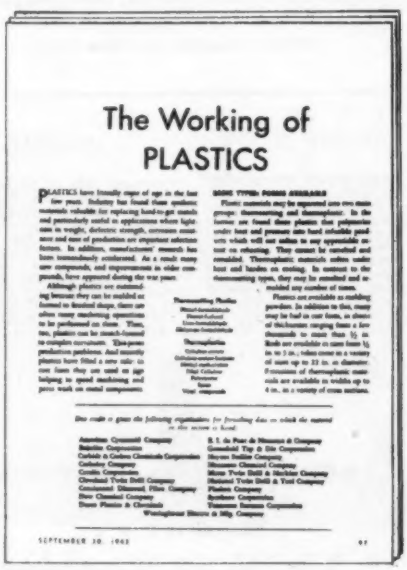
R. G. LeTourneau, large producer of earth-moving equipment, is planning to build a machine after the war so efficient that it will necessitate its purchase by contractors to meet competition because of the economics it will effect.

Things are going on.

o

Plastics Know-How . . . In the Oct. 14th issue of *AM* appeared another in the series of "blue sections" called "The Working of Plastics". Superseding a similar section of a few years back, it brings to you the latest compilation of plastic working practice in leading plants.

With the Metal-Working industry engaging more and more in the fabrication of plastic materials, this section is timely and should prove very useful. Reprints are available, as usual at 15c each, and we'll be glad to take care of your requests.


The Working of PLASTICS

MEMO

Don't Forget— Bevel Gears for ANY Speeds!

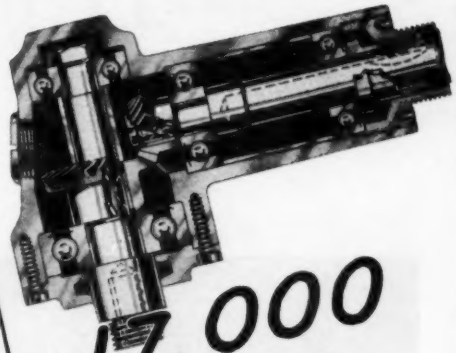
Remember this rule for efficient angular power transmission at any speeds:

For peripheral gear velocities below 1000 ft./min., use straight bevel, spiral bevel, Zerol bevel, or hypoid gears.

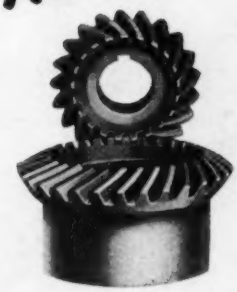
Above 1000 ft./min., use spiral bevel or hypoid gears.

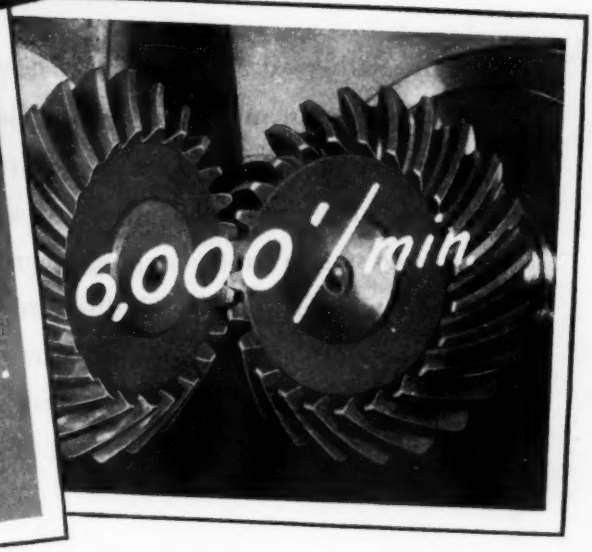
Choose the right bevel or hypoid gears, cut and assemble them correctly—and you will be able to handle any speed. The gears shown here, designed to Gleason standards, and made on Gleason machines, have given smooth, long-life operation at the continuous high speeds noted.

For the best in performance and durability, use bevel gears in your own high-speed drives. Gleason engineers will be pleased to assist you in their design and in specifying the correct machines for their manufacture. Let us turn to your benefit our 78 years' experience in making power "turn a corner."



17,000 R.P.M.





GLEASON

GLEASON WORKS

Builders of Bevel Gear Machinery for Over Seventy-five Years

1000 UNIVERSITY AVENUE, ROCHESTER, N. Y., U. S. A.

ARMY E NAVY

CINCINNATI

1-18 MILLER and . . . doubles

CINCINNATI *1-18 Plain Automatic Milling Machine. Catalog M-848 gives complete specifications.*

Illustrated at the right is a close-up of a CINCINNATI 1-18 Plain Automatic Milling Machine and the CINCINNATI engineered fixture that virtually doubled production on this gun part.

The engineers here at Milling Headquarters have developed many types of fixtures which have increased production of countless parts. One example is shown on the opposite page. This is a two station hand clamping progressive type fixture. Equipped with this fixture, the machine completes one piece every cycle as the work progresses from first to second station. Station one holds work when milling first side, locating from rough forged back, and station two holds work when milling opposite side, locating from previously milled side in station one. ¶ It's possible some of your milling operations could be speeded up through the use of CINCINNATI millers with the right fixtures and cutters. Why not discuss this possibility with CINCINNATI engineers? They may find a much better way to mill some of your jobs.

Navy E awarded March 6, 1942. Renewal star awarded August 29, 1942, along with Army-Navy E. The second star was awarded February 23, 1943, and the third star September 27, 1943.

THE CINCINNATI

MILLING MACHINES

CINCINNATI Engineered Fixture

this gun part production

For a brief description of the entire CINCINNATI *Line, look in Sweet's Catalog File for Mechanical Industries.*

MILLING MACHINE CO. CINCINNATI, OHIO, U. S. A.

BROACHING MACHINES • GRINDING MACHINES • LAPPING MACHINES

Advantages of Jones & Lamson Optical Comparators

1. Machine operation can be learned in minutes. . . **2.** One of the fastest inspection methods known. . . **3.** Permits study of tool wear and hardening distortion. . . **4.** Permits taking advantage of full allowable tolerances. . . **5.** Enlarged shadow can be studied by several persons at same time. . . **6.** Enlarged shadow can be photographed.

OF COMPLICATED PARTS . . .

You are making parts for airplanes, engines, shells, fuses, bombs, guns or tanks . . . Parts that are slow, difficult or even impossible to inspect by mechanical gaging . . . You'll be interested in these facts about **Jones & Lamson Optical Comparators** in the tool room or production line—

- They permit rapid, accurate inspection and comparison by means of a magnified shadow.
- They permit the measurement of angles in degrees and minutes. Lead or spacing. Height or depth.
- They permit the inspection of tools, gages and parts with irregular contours, by comparison with master outlines.

Jones & Lamson Inspection Engineers can help you set up the fastest, most economical method of staging and handling your inspection work. Their knowledge of holding fixtures, handling methods and suitable Comparator equipment is saving many thousands of dollars in manufacturing plants throughout the country.

We invite you to send samples or blue prints to Jones & Lamson Machine Company, Springfield, Vermont.

For rapid, economical inspection . . . BEYOND A SHADOW OF A DOUBT!

JONES & LAMSON

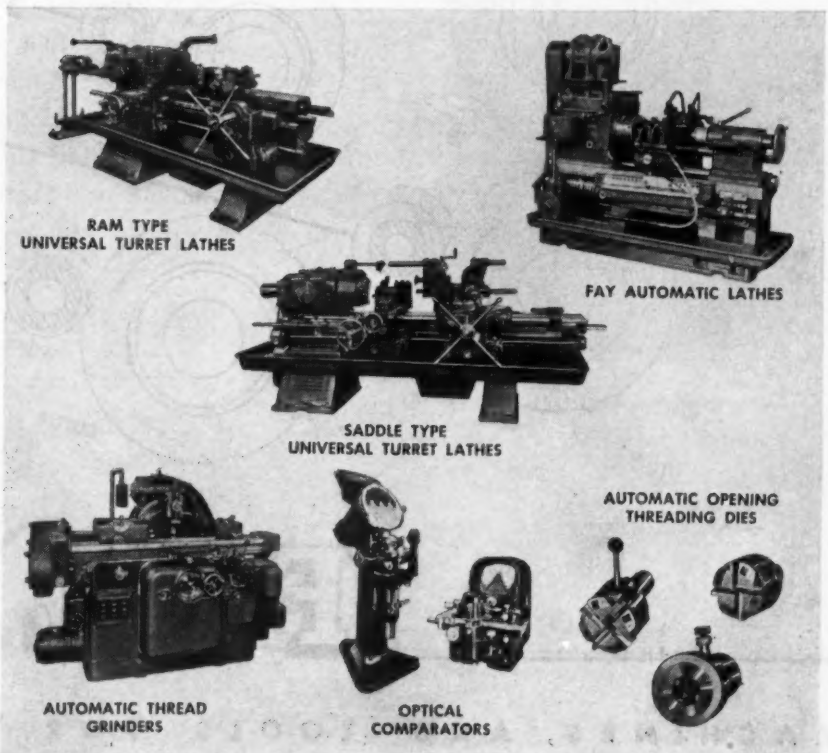
MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

OPTICAL COMPARATORS

Manufacturers of:
Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies

PROFIT-PRODUCING MACHINE TOOLS

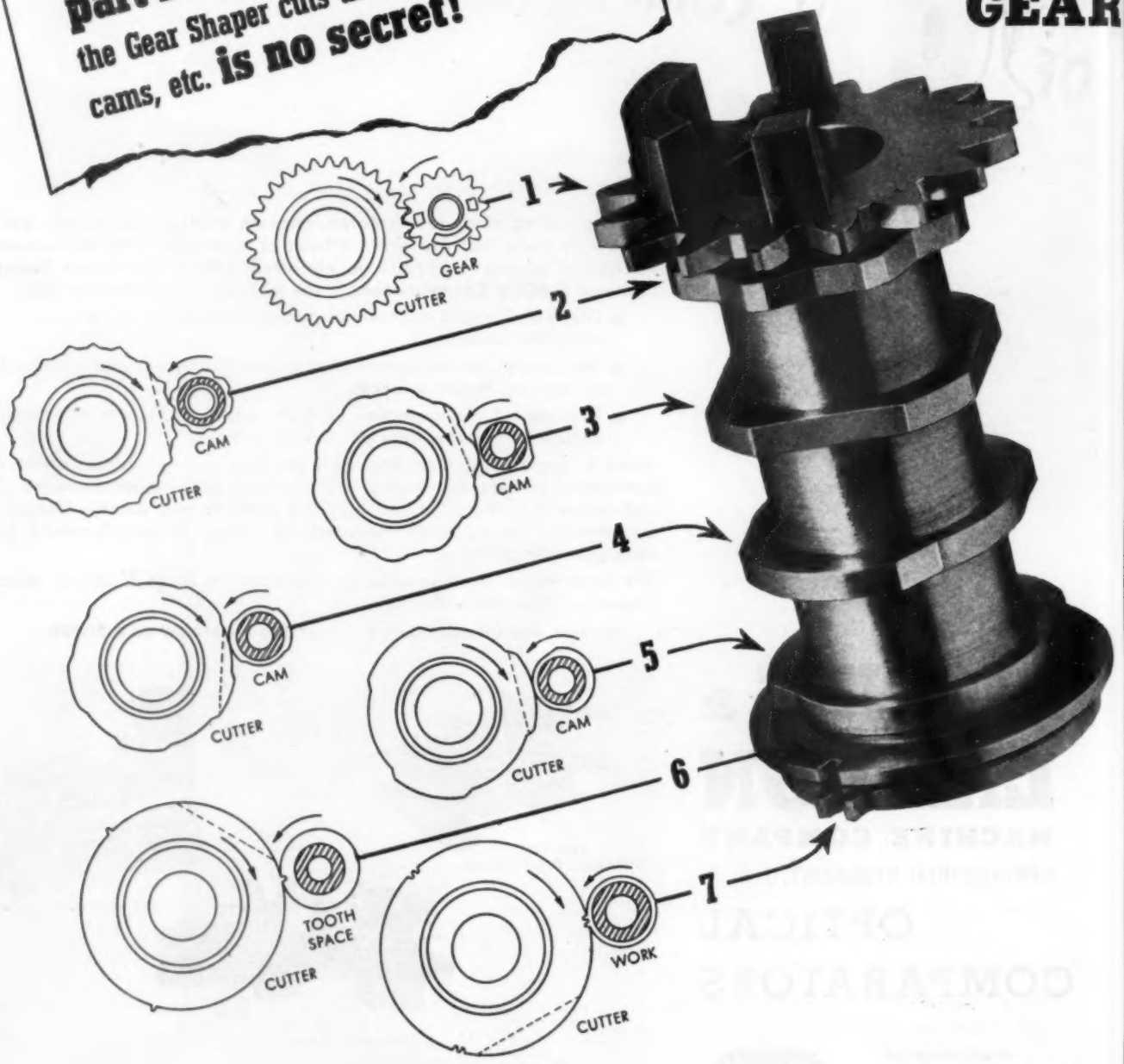


WAR PRODUCTION BULLETIN

We can't tell you what this part is used for—but how simply the Gear Shaper cuts the 7 different gears, cams, etc. **is no secret!**

Example A

GEAR SH



FELLOWS

MACHINES AND TOOLS FOR GEAR PRODUCTION

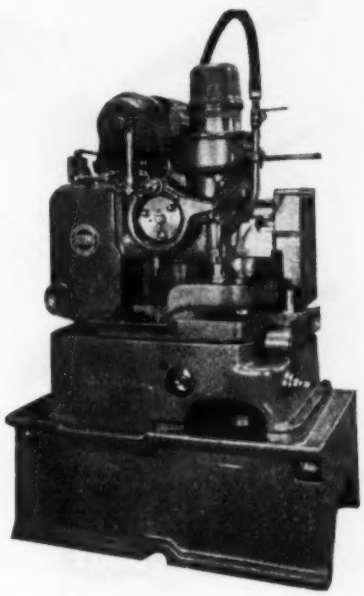
le AA-1 OF THE
AR SHAPER'S VERSATILITY

Presented here is an excellent example of the Gear Shaper Method which employs a reciprocating type of generating tool. Seven different and distinct operations are performed on this part, as shown by the diagram, including four different shaped cams.

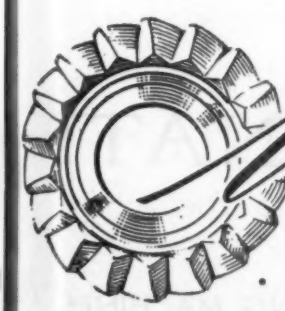
Of course, it requires a different cutter and set-up for each operation, but with Gear Shaper tooling, it is possible to hold the "positioning" of the various cams in alignment with each other within the close limit of 0.001 inch. All radii on the cams must be held to the same limit.

What at first glance appears to be an almost impossible machining problem has been simplified and made practicable by the Gear Shaper Method. And due to the accuracy inherent in the Gear Cutter, successive production lots can be exactly duplicated indefinitely.

Many other "problems" are illustrated in our general catalog, "The Fellows Method", for your copy, write: The Fellows Gear Shaper Company, Springfield, Vermont — or 616 Fisher Building, Detroit, or 640 West Town Office Building, Chicago, Illinois.



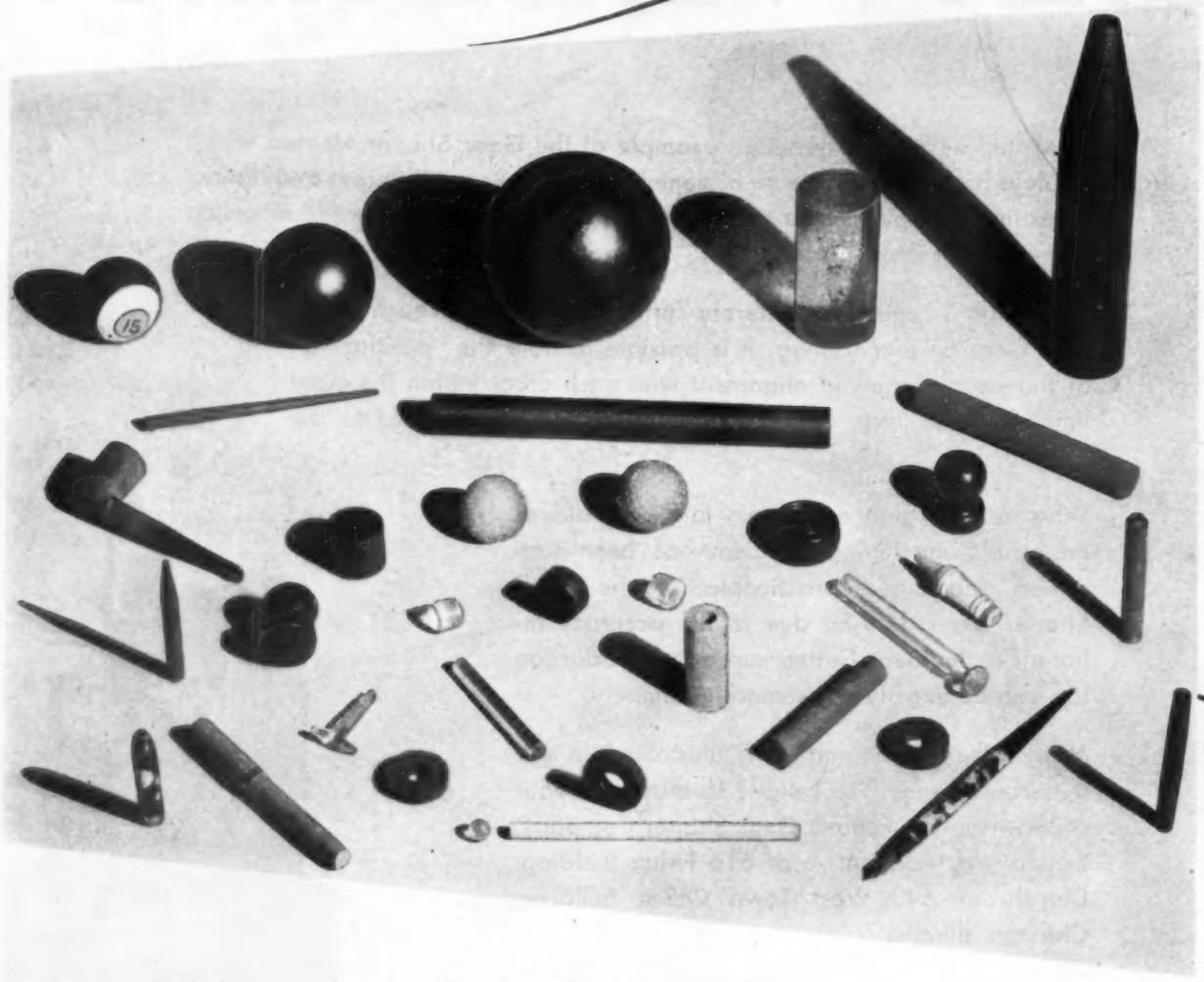
7A-Type Fellows High-Speed Gear Shaper



Method

. . . . FROM BLANK TO FINISHED GEAR

DID YOU KNOW YOU CAN GRIND



A group of non-metallic parts, precision ground at unusually high production rates, on CINCINNATI *Centerless Grinders.*

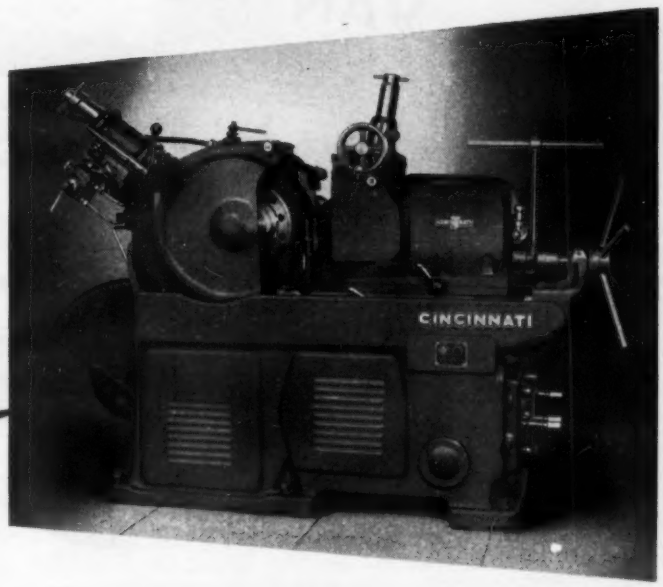
Navy E awarded March 6, 1942. Renewal star awarded August 29, 1942, along with Army-Navy E. The second star was awarded February 23, 1943, and the third star September 27, 1943.

CINCINNATI

CENTER TYPE GRINDING MACHINES

GLASS PLUG GAGES or CERAMIC CORES on a . . .

CINCINNATI CENTERLESS?



That the grinding possibilities of the CINCINNATI Centerless are almost limitless is evidenced by the wide variety of materials now being ground on these machines. The parts shown in the illustration on the opposite page constitute a typical non-metallic group. ¶ Almost any kind of metal and metal substitutes, wood, glass, rubber, porcelain, plastics and others, are successfully ground, either cylindrically or spherically, to exceedingly close tolerances, by the centerless method. The high rate of production on many war essentials may be traced to centerless grinding. ¶ Simple, safe, convenient, and easy to operate, CINCINNATI Centerless Grinding Machines have greatly increased production on many jobs previously handled by other methods. The engineers here at Grinding Headquarters are constantly increasing the usefulness of and widening the application for CINCINNATI Centerless Grinders. They may have the answer to your problems involving either centerless or centertype grinding. ¶ Look in Sweet's Catalog File for Mechanical Industries for brief description of the entire line. For complete information on the CINCINNATI No. 2 Centerless Grinder shown above, write for specification catalog G-456-1.

GRINDERS INCORPORATED

CINCINNATI, OHIO, U S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

DIFFERENTIAL

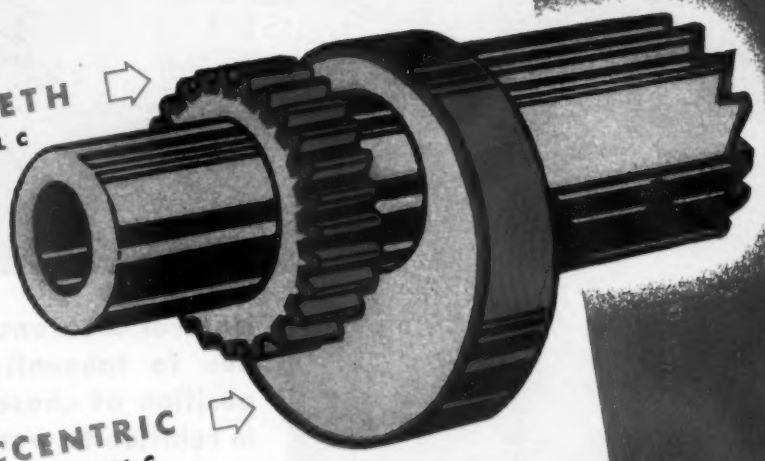
ON THE SAME WORK PIECE IS QUICKLY VAN NORMAN HIGH FREQUENCY

Typical work-holding fixture and coil arrangement used to harden the clutch teeth. Total hardening operation is completed in 13 seconds.

To harden the eccentric a horizontal-type work-holding fixture is used. Shape of the heating coil follows the shape of the eccentric.

"IT PAYS TO

HARDENING
AND EFFICIENTLY PERFORMED WITH INDUCTION HEATING . . . .



● Since Van Normanizing permits users to heat a specific portion of metal to a predetermined depth, hardening different parts to various degrees of hardness on the same piece is easily and quickly accomplished with Van Norman High Frequency Induction Heating. In the illustration, three different surface hardening operations are performed. Gear teeth are hardened to 54 Rockwell C in 16 seconds; eccentric to 62 Rockwell C in 22 seconds; clutch teeth to 57 Rockwell C in 13 seconds. There is no warping or distortion, and the finished part is free from undesirable scale. And because the entire heat and quench cycle is automatic, finished parts are identical in hardness and physical characteristics.

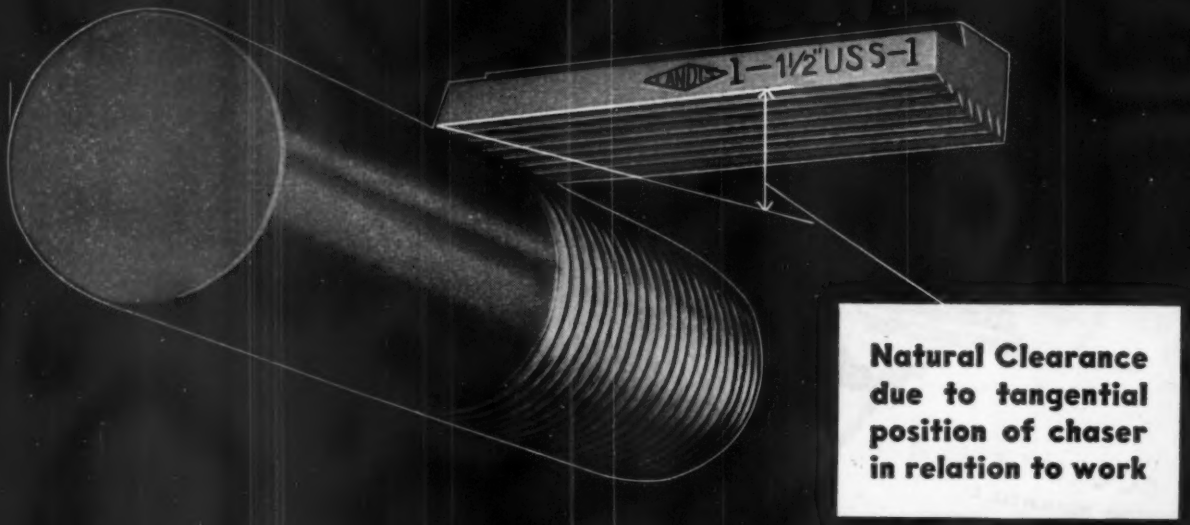
However, hardening is but one of the many time and cost saving operations performed with Van Norman High Frequency Induction Heating. Other applications include BRAZING, SOLDERING, ANNEALING, FORGING, and MELTING. Find out why It Pays To Van Normanize Now. Write for Van Norman Catalog today. It gives a complete story in the uses, possibilities, and advantages of Van Norman High Frequency Induction Heating.

ARMY E NAVY

VAN NORMAN COMPANY
SPRINGFIELD, MASSACHUSETTS

VAN NORMANIZE"

LEADING FEATURE OF THE LANDIS CHASER INSURES THREAD OF ACCURATE LEAD



12 Features of the LANDIS TANGENTIAL CHASER

1–Permanent throat permits close to shoulder threading throughout life of chasers
2–Rake angle range covers all machinable materials
3–Free cutting condition permits maximum cutting speeds
4–Simple grinding operation renews entire cutting edge and leading feature
5–Line contact with work lessens friction and minimizes thread distortion
6–Leading feature insures thread of accurate lead
7–Lateral absorption of cutting strain reduces vibration and chaser breakage
8–Right and lefthand threading feature reduces chaser equipment
9–Standard chasers thread all diameters with proper chaser holders
10–Interchangeability of chasers lowers operating cost
11–Chaser length provides exceptionally long life and low tool cost
12–Permanent throat gives equal distribution of cut

The Leading Feature Assures Accurate Pitch

The lead controlling feature of the Landis Chaser is not destroyed by regrinding. The entire cutting edge is completely renewed each time the chaser is reground, and for this reason the chasers will produce threads which are accurate for lead throughout their entire life.

The natural clearance provided by the tangential alignment of the chaser with the work reduces the bearing surface to a theoretical line of contact.

The Finest Thread Cutting Tool in Industry

LANDIS MACHINE COMPANY

WAYNESBORO, PA., U.S.A.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

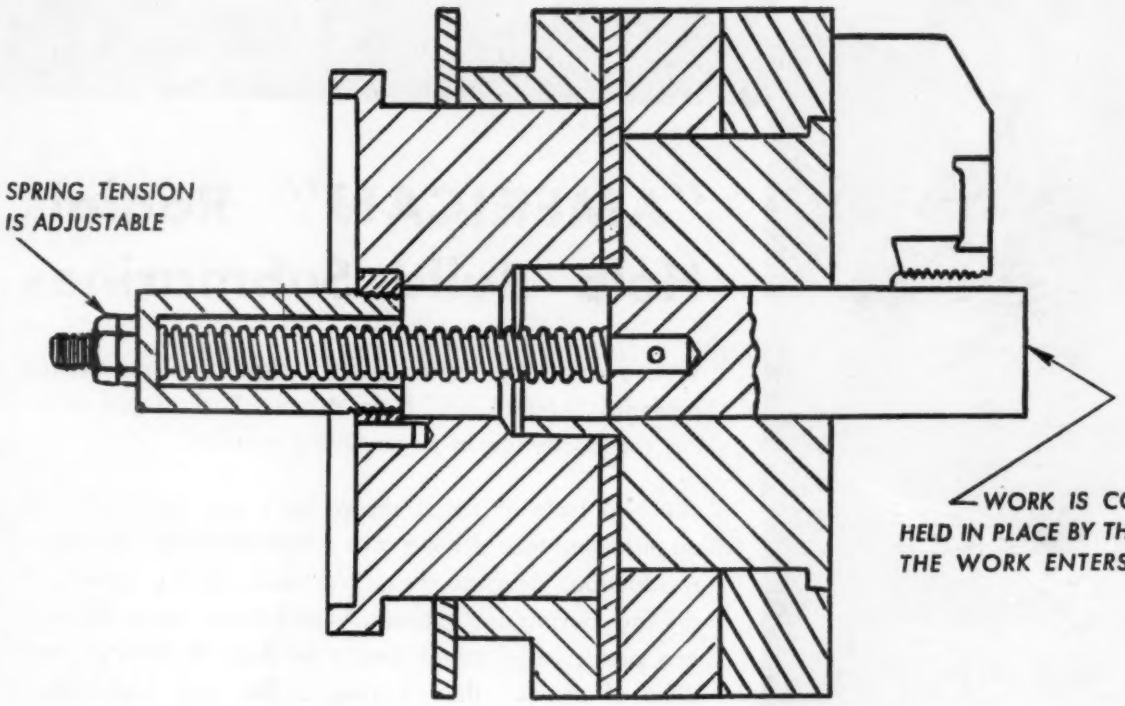
LANDIS REG. U.S. TRADE—MARK PAT. OFF.

THREAD TIPS

A Good Mechanic Knows and Cares For His Machine

In the Interest of Efficiency, Better Workmanship and Higher Production

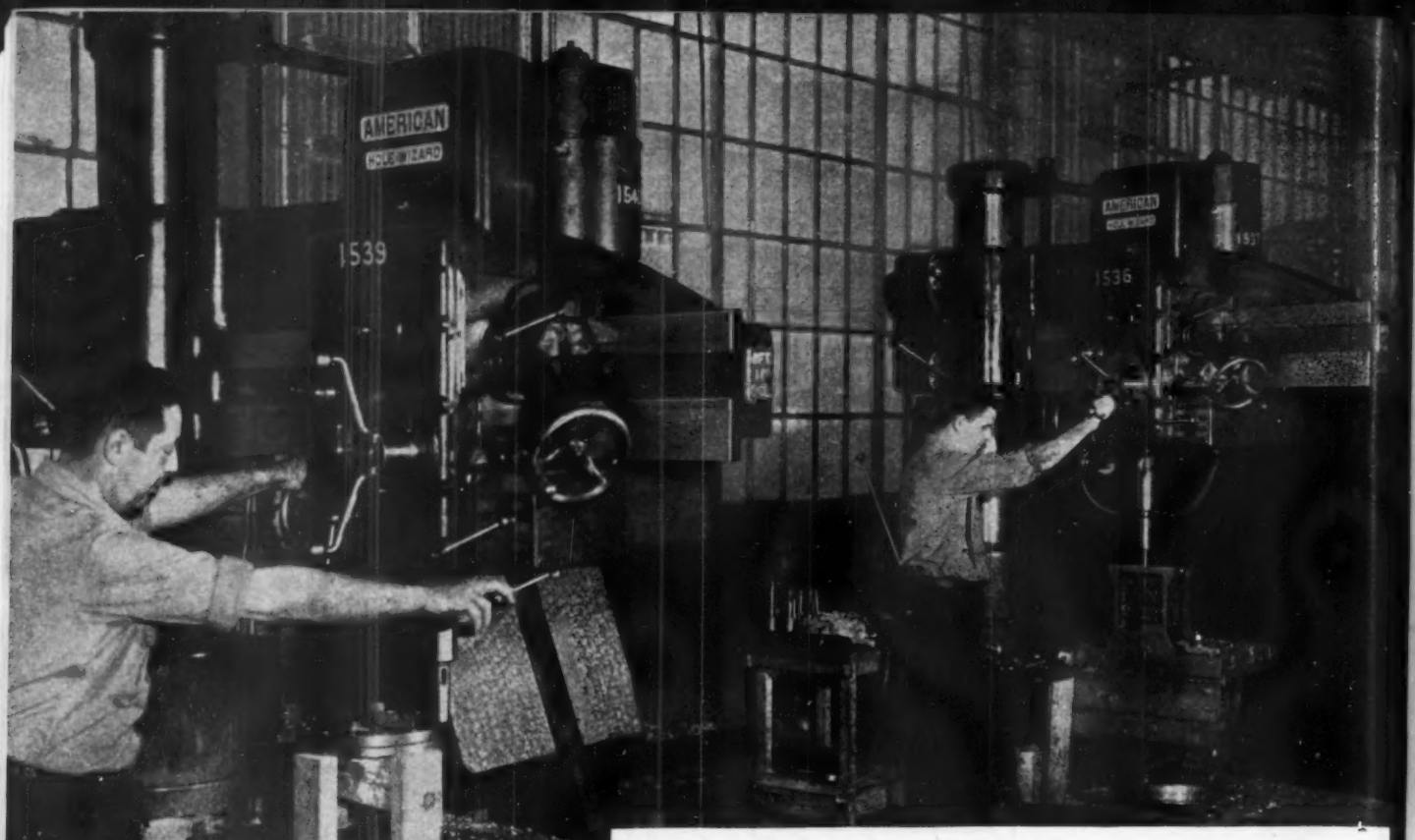
LANCO HEADS ARE READILY ADAPTABLE TO THE USE OF SPRING PILOTS—WHICH MAY BE NECESSARY FOR THREAD CONCENTRICITY



THE ABOVE SKETCH SHOWS THE MANNER IN WHICH A SPRING PILOT FOR SUPPORTING THE WORK MAY BE APPLIED TO LANCO HEAT TREATED HEADS.

Be Threadwise—Employ LANDIS Long Life Tangential Chasers

LANDIS MACHINE COMPANY, WAYNESBORO, PENNA, U.S.A.



"AMERICAN"

FOR
ALL-OUT
PRODUCTION

"AMERICAN" Radials Help Build Submarines

Where accuracy standards are rigid and production essential "AMERICAN" Hole Wizard Radials are meeting the challenge in a gratifying manner.

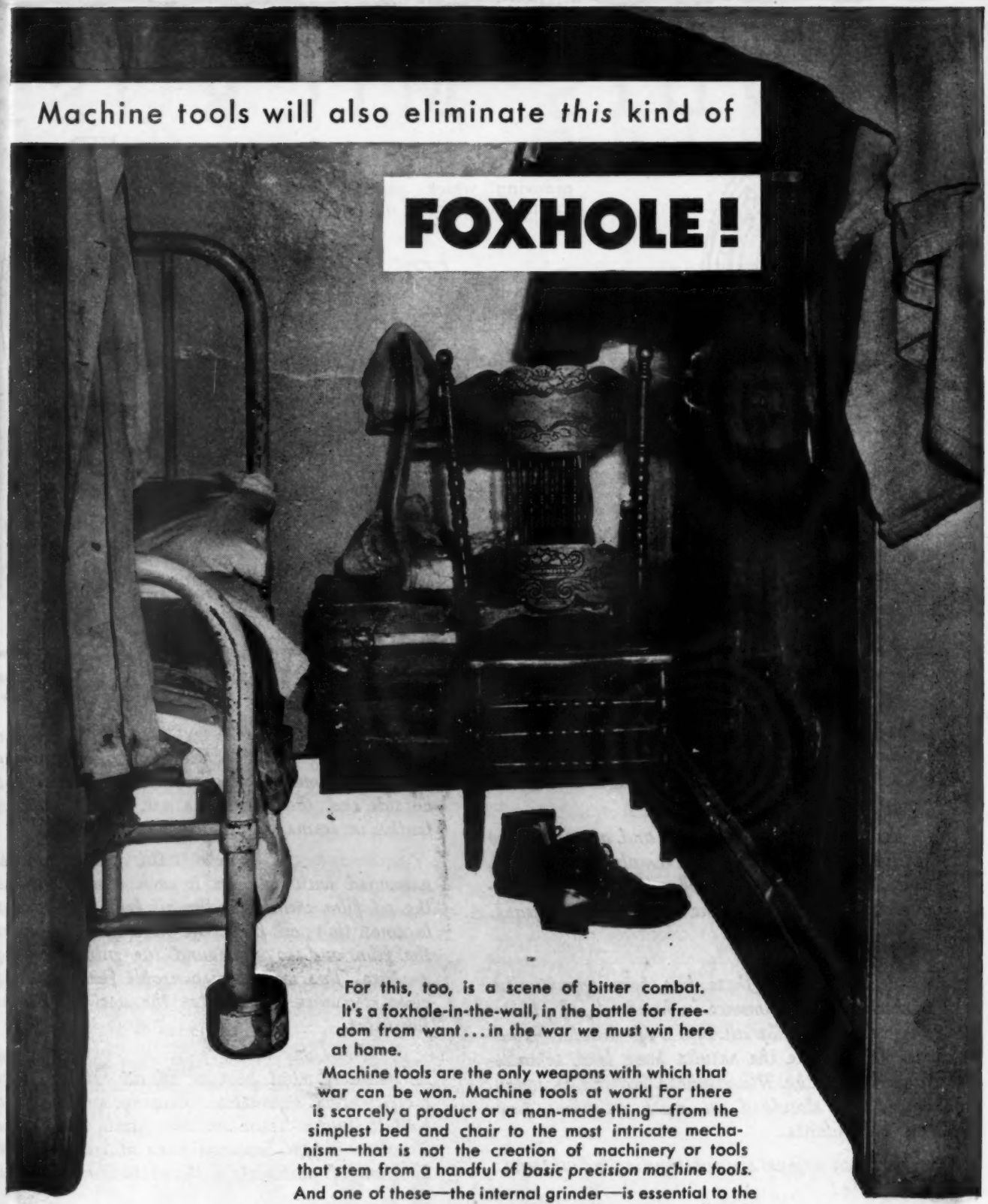
The two Hole Wizards shown here are hard at work on miscellaneous drilling jobs encountered in submarine production. Because these jobs cover such a variety of drilling, boring and tapping "AMERICAN" Hole Wizards are particularly suited owing to their flexibility, their ease of control, their boring ability and high speed tapping facilities.

For all-out production, select "AMERICAN" Hole Wizards—hundreds of contractors are thankful they did.

THE AMERICAN TOOL WORKS CO.
CINCINNATI, OHIO, U. S. A.

"AMERICAN" *Hole Wizard* RADIALS

LATHES **RADIALS** **SHAPERS**



For this, too, is a scene of bitter combat. It's a foxhole-in-the-wall, in the battle for freedom from want... in the war we must win here at home.

Machine tools are the only weapons with which that war can be won. Machine tools at work! For there is scarcely a product or a man-made thing—from the simplest bed and chair to the most intricate mechanism—that is not the creation of machinery or tools that stem from a handful of *basic precision machine tools.*

And one of these—the internal grinder—is essential to the creation of nearly every machine and tool that will make for a finer standard of living after this war.

It is because of this that the job ahead of us, here at Bryant, will continue to be a truly great one when the war is won.

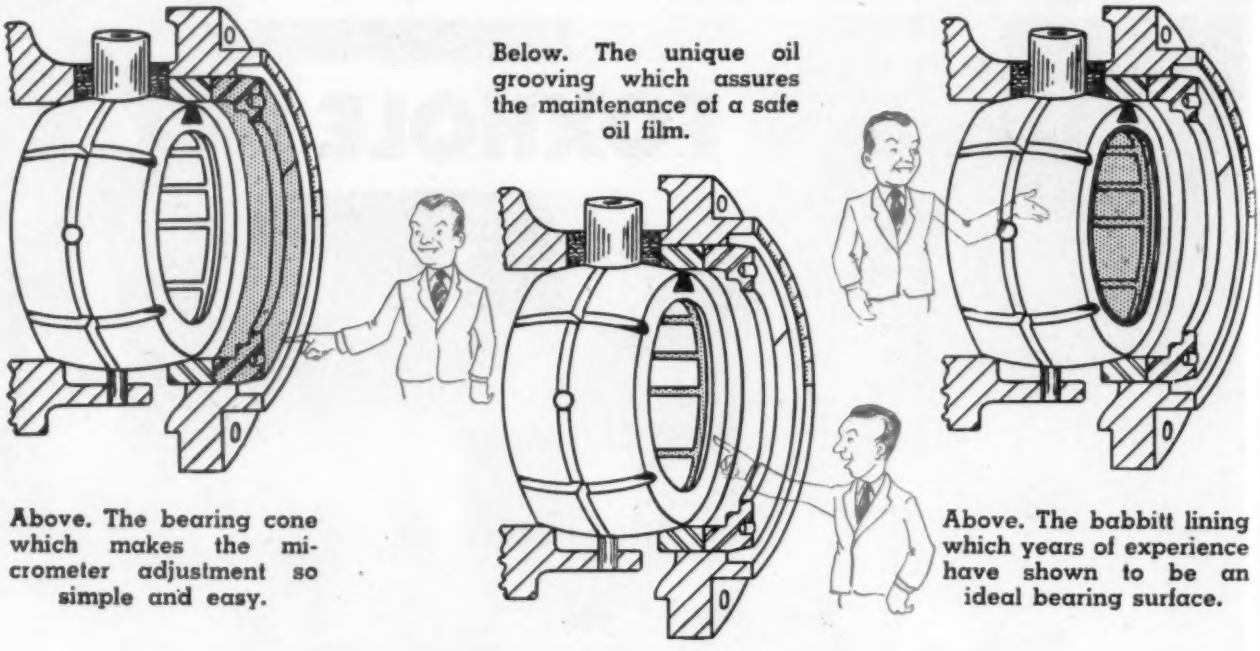
Call on us!

BRYANT

BRYANT CHUCKING GRINDER COMPANY Springfield, Vermont, U.S.A.

To Finish The Job Quicker . . .

LANDIS MICROSP



Above. The bearing cone which makes the micrometer adjustment so simple and easy.

Below. The unique oil grooving which assures the maintenance of a safe oil film.

Above. The babbitt lining which years of experience have shown to be an ideal bearing surface.

KEEP WHEEL SP

It has often been said that the wheel spindle bearing is the heart of a precision grinder. The truth of this statement is very generally conceded.

The degree of both finish and accuracy now required has necessitated a completely different approach to the problem of wheel spindle bearing design. Realizing the trend several years ago, Landis engineers conceived an entirely new kind of wheel spindle bearing which was named the Microsphere. There has been opportunity to check its performance in hundreds of plants and on practically all types of Landis Grinders. Everywhere the results have been so satisfactory that the Microsphere bearing is today considered standard on most machines leaving our plants.

The user enjoys six outstanding advantages, which are:

1. Positive Micrometer Adjustment. **Bearing clearance may be readily changed or duplicated by means of a micrometer dial at the outside end. Dial readings are positive and in tenths in terms of bearing clearance.**

2. Unique Oil Grooving. **Oil grooves are so arranged with relation to each other that as the oil film created by the oil from one groove becomes thin, oil from the next groove renews the film and so on around the entire bearing surface. This is an indispensable feature where close clearance necessitates the use of a light lubricant.**

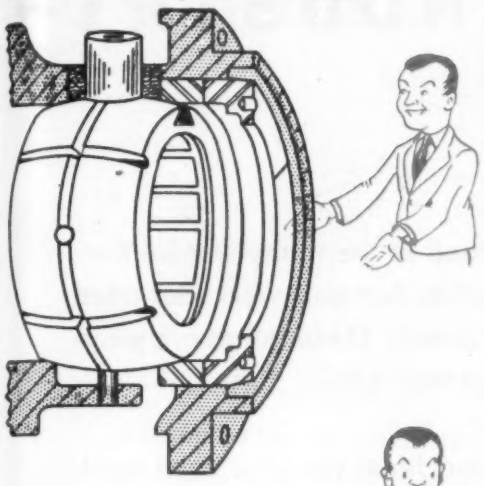
3. Made of Babbitt Lined Steel. **Bearing is made of steel because of its relatively low coefficient of expansion. Bearing surface is a babbitt lining spun on the steel. For years Landis cap type bearings have utilized this combination of materials with outstanding success.**

PRECISION LANDIS GRINDERS

Unusual Performance As Usual

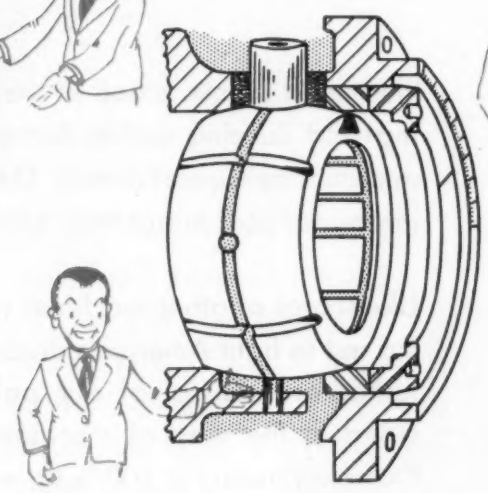
PUBLIC LIBRARY
DETROIT MICH.

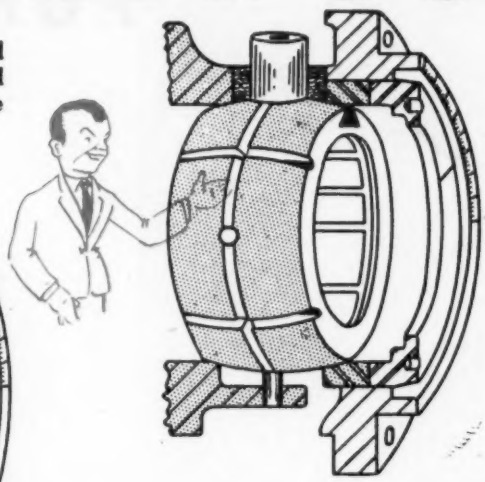
HERE BEARINGS



Above. The cartridge which is removable and all of which for a given machine are interchangeable.

Below. Complete flood lubrication — a method which is simple, positive and dependable.





Above. Spherical shape of bearing, plus the method of mounting, which makes it self-aligning.

INDLES TURNING

4. Easy Maintenance. Each bearing is mounted in a removable cartridge and all cartridges for a given machine are interchangeable. There is little loss of production time those few instances when a bearing requires inspection or replacement.

5. Flood Lubrication System. Oil slingers on the spindle carry the lubricant to the top of the bearings, where it feeds downward by gravity into the oil grooves. Bull's-eye gauges at front indicate amount of oil in reservoir and flow of oil to each bearing.

6. Self-Aligning. The spherical shape of the bearing, combined with the manner in which it is held in its cartridge, makes it self-aligning. Once properly aligned and rigidly clamped in its cartridge, it is certain to maintain alignment.

Absolute rigidity is inherent in the Landis Microsphere wheel spindle bearing. Its new features, plus certain elements of design carried over from older Landis bearings, is assurance that every effort has been made to give the user the benefit of all that is best in wheel spindle bearing construction.

Keep your wheel spindles turning on Landis Microsphere bearings . . . they are certain to give you years of trouble-free performance.

LANDIS TOOL CO. WAYNESBORO, PENNSYLVANIA

LANDIS EXCELLENCE

CONTRIBUTES TO VICTORY

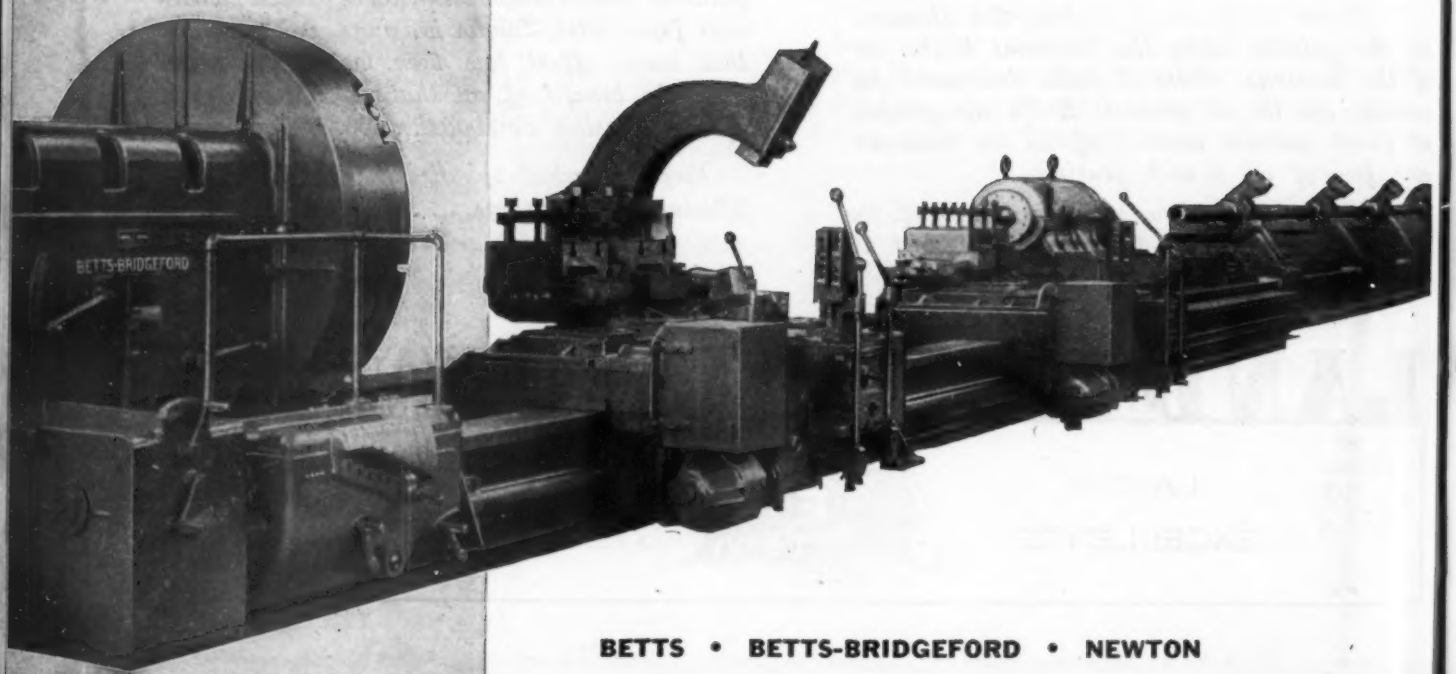
409

Heavy Machine Tools

FOR WAR INDUSTRY—

Illustrated below is one of the many special Boring and Turning Lathes for gun work designed and built by Consolidated. These lathes are playing a real part in our War effort.

Like scores of other machines we have been sending out to fight America's production battle, these lathes are typical of our policy to let nothing stand in the way of machine tools for Victory. Our plant today is 100% on war production. But we know there's a day of peace coming—a day when full scale production of civilian goods will again prevail. When that day comes Consolidated will be ready to meet your needs for machine tools.



BETTS • BETTS-BRIDGEFORD • NEWTON

CONSOLIDATED MACHINE TO

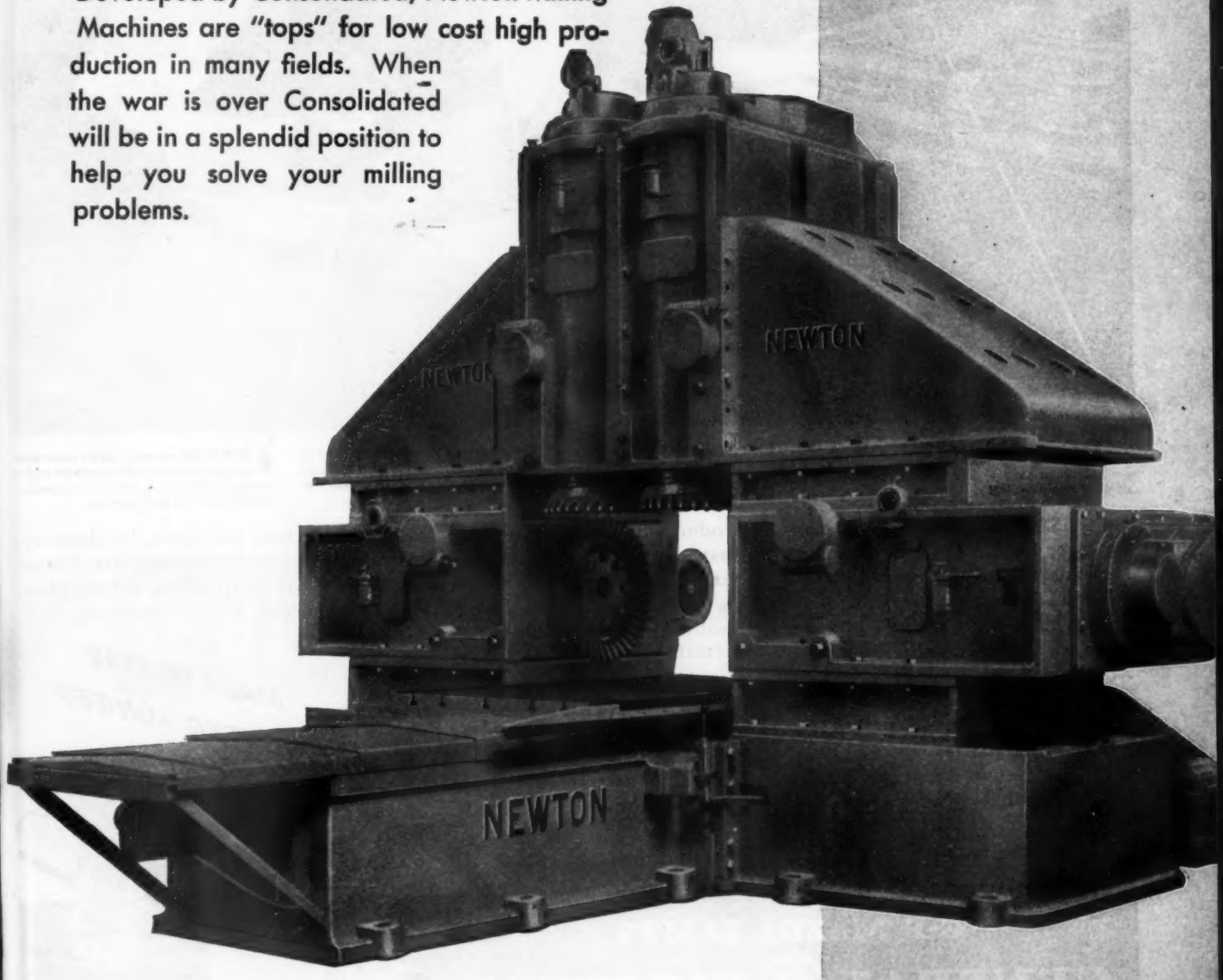
ROCHESTER 10 NEW

Production Equipment

FOR POST-WAR WORK

Designed for handling tractor parts, the machine shown below is but one of a great many Newton high production Milling Machines that will be in demand after the war.

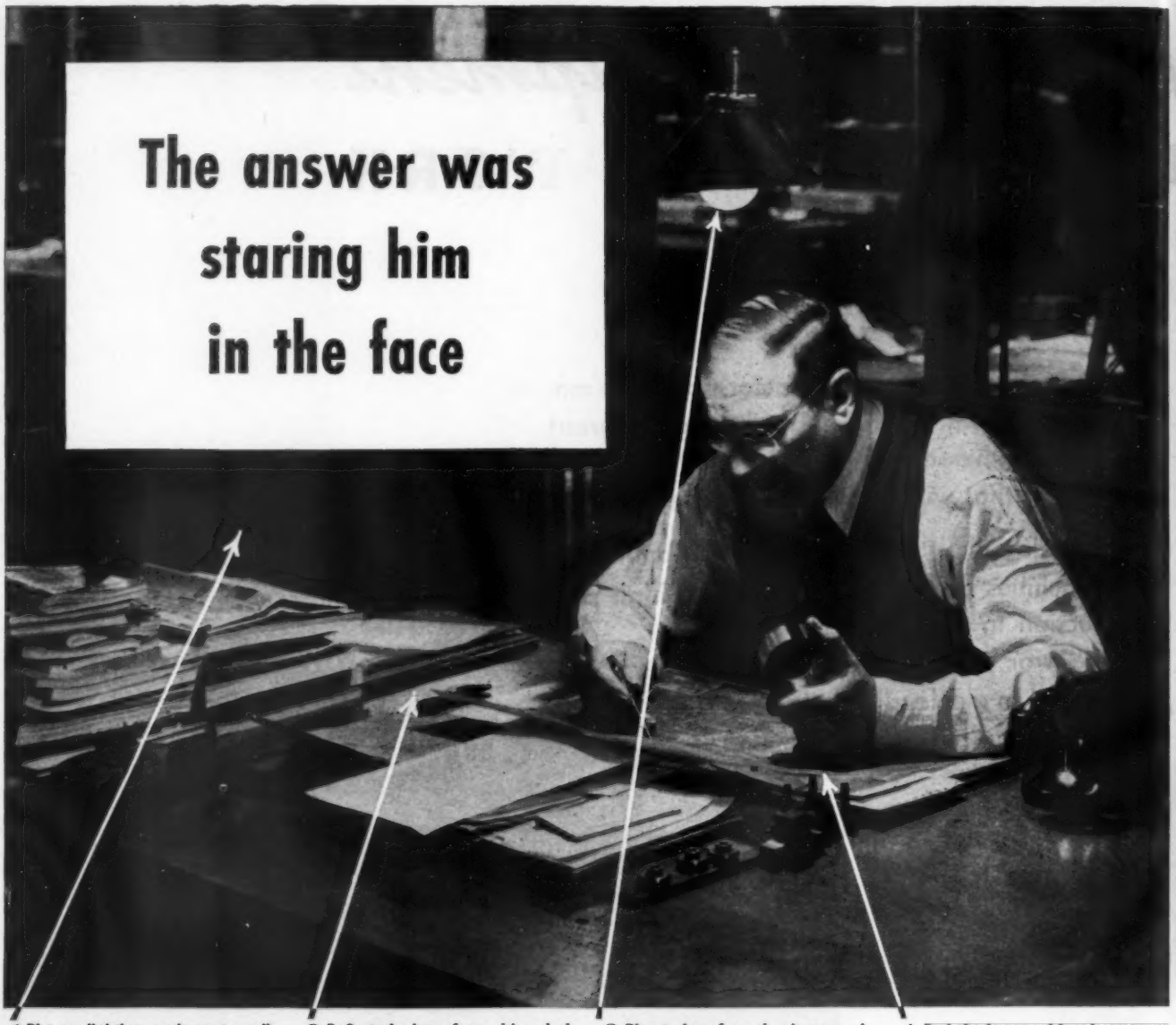
Developed by Consolidated, Newton Milling Machines are "tops" for low cost high production in many fields. When the war is over Consolidated will be in a splendid position to help you solve your milling problems.



COLBURN • HILLES & JONES • MODERN

TOOL CORPORATION

NEW YORK



1 **Dirt on lighting equipment, walls and ceilings.** A regular cleaning program can save as much as 50% of your effective light.

2 **Reflected glare** from shiny desk top and the machined parts on his desk has its counterpart in reflected glare from machinery in the factory.

3 **Direct glare** from that improperly shaded lamp bulb is also present in the factory. It tires men out—increases chance of errors.

4 **Bad shadows and harsh contrasts** caused by poor arrangement make seeing difficult, puts unnecessary strain on eyes and nerves.

THIS man is production manager in a three-shift war plant. He's anxious to step up production. What he doesn't realize is that poor seeing conditions right at his own desk are also present in the factory . . . that if these conditions were improved, he would see better with less eyestrain and so would the workmen in the factory. Repeated tests have shown that where seeing conditions have been improved, production increased—with less waste, fewer rejects, and better quality work. In many plants simple changes in the lighting have resulted in greatly improved production.

TO PRODUCTION MEN: Call General Electric and ask for a wartime lighting counsellor. Without obligation, he will show you how lighting can be revamped to improve seeing and increase production—by moving a fixture here and there, by cleaning, painting, or removing glare. Phone your G-E lamp office, G-E supplier, or electric service company.

MADE TO STAY BRIGHTER LONGER

THE BEST INVESTMENT IN THE WORLD IS IN THIS COUNTRY'S FUTURE—BUY WAR BONDS

G-E MAZDA LAMPS

GENERAL ELECTRIC

Hear the General Electric radio programs: The "Hour of Charm" Sunday, 10 p.m. EWT, NBC; "The World Today" news every weekday, 6:45 p.m., EWT, CBS.

the biggest quiz program of all

It doesn't have a $64 question. It has millions of them. It is an international program that must originate in the minds of men — American production men. It should be in the planning stage right now. It has to be ready to go with Victory . . . when plants now three-shifting for war, turn to "peace-work". When world markets are but sixty hours from your shipping depot. When your peace-work product must meet and beat competition. Too late then to plan for better, cheaper, faster production. The time to face the future is *now*. The profitable time to retool is *now*. If it's lathes — turn to LeBlond for better turning equipment.

THE R.K. **Le BLOND** MACHINE TOOL CO., CINCINNATI, 8

NEW YORK 13, 103 Lafayette St. CAnal 6-5281

CHICAGO 6, 20 N. Wacker Dr. STA 5561

time to retool

Turn to Le Blond for Turning Equipment

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

Check-Clip-Mail

FOR ILLUSTRATED SPECIFICATIONS:

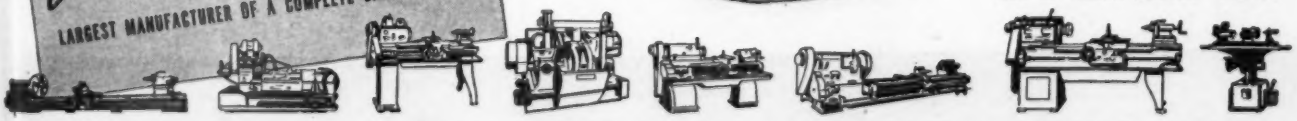
- ☐ HEAVY DUTY GEARED HEAD ENGINE LATHES
- ☐ TOOL ROOM LATHES
- ☐ AUTOMATIC LATHES
- ☐ HEAVY DUTY GEARED HEAD GAP LATHES
- ☐ SUPER REGAL GEARED HEAD LATHES
- ☐ RAPID PRODUCTION LATHES
- ☐ AUTOMATIC CRANKSHAFT LATHES
- ☐ No. 2 CUTTER GRINDER

YOUR NAME _____ TITLE _____

YOUR FIRM _____ ADDRESS _____

★ YOUR BONDS BUY BOMBS ★

BUY A "BLOCK-BUSTER" TODAY!



HD Engine Lathes—Nine sizes ranging from 12" to 50" swings. For versatility in turning.

Automatic Lathes—12" & 16" Mechanical or Hydraulic power.

Super Regal Lathes—Six sizes, 13" to 24" Best for training.

Automatic Crankshaft Lathes—For all facing, turning, finishing, pins.

Tool Room Lathes—12", 14", 16" and 18" swings. Versatile.

HD Gap Lathes—Ten sizes in Regular and Sliding Gap models.

Rapid Production Lathes—13", 17", 20" swings. Six speeds. Faster output. Lower cost.

No. 2 Cutter Grinder—Internal, cylindrical, face and angular work.

Something Good

Reports from our fighting forces indicate that these men worry most, in their few idle moments, about what they are coming home to. Will there be work for them, either in their old jobs or in new ones?

The answer is largely up to us. If we do everything we can to shorten the hectic interval between wartime and peacetime production, we can receive millions of our returned military men into the jobs to which they are entitled.

Alert manufacturers are now doing this long distance planning. They are checking equipment, and preparing to discard worn-out, obsolete or inefficient tools. They know that only modern machinery can keep down the cost per unit, yet permit payment of a wage that will maintain our living standards.

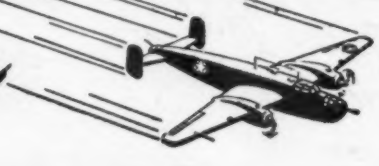
Monarch will be ready with the latest in lathe improvements. Even now, relieved somewhat from Victory problems, our engineers are planning, checking, testing new developments to give you more efficient and more productive lathes than ever before.

Thus, as always, we hope to help you produce more goods for more people at lower cost. And the result will be an America which is good to come home to.

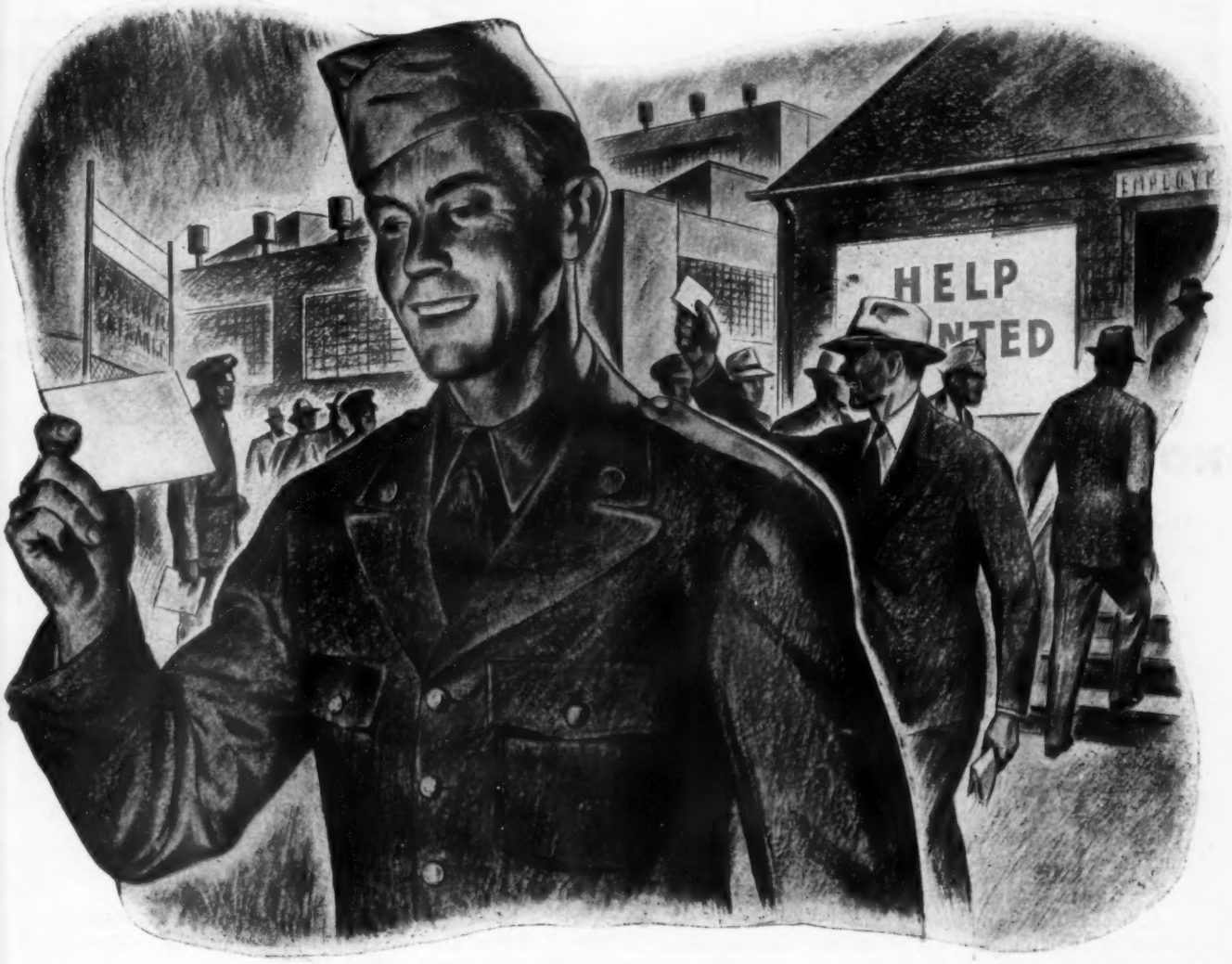
THE MONARCH MACHINE TOOL COMPANY · · · SIDNEY · OHIO

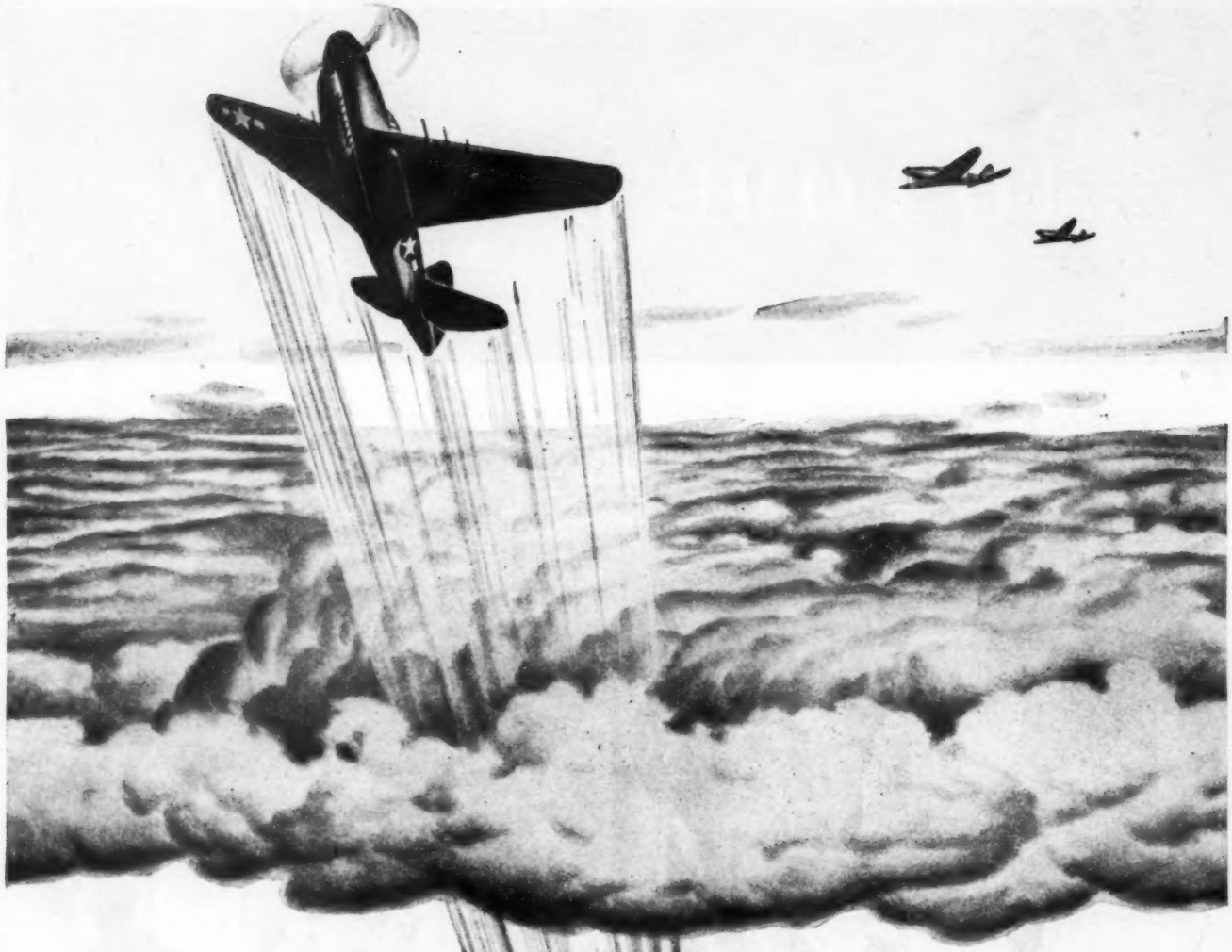
MONARCH LATHES

Save Time



TO COME HOME TO!





NOTHING TO IT, EH?

Modern war planes can climb a mile a minute. In very few minutes a fast climber can be up in the sub-stratosphere. But . . .

Temperature takes a nose dive as the plane soars higher. At 20,000 feet the temperature is well below zero. Apparently at about 35,000 it becomes fixed . . . *at 70 degrees below zero* in the temperate zone. Over the equator, stratosphere temperature drops as low as 100 degrees below zero.

Both pilot and plane encounter troubles in the bitter-cold, rarefied air of the sub-stratosphere. Moisture freezes, oil congeals, engines gasp and die unless aided by turbo-superchargers.

Nevertheless, planes and pilots are learning to fight at higher and higher levels—thanks to research conducted on the ground in test chambers which reproduce the conditions of the stratosphere. Accurately controlled *air conditioning and refrigeration*...plus controlled pressure...make these tests possible.

This is one of the many interesting and important ways in which air conditioning is contributing to our war effort. To do the tasks of war time, General Electric has developed dependable air conditioning and industrial refrigeration equipment...equipment that is more flexible, more compact, more efficient.

After the war, lessons learned in wartime production will be applied to making better peacetime air conditioning. This will be made available to all from General Electric.

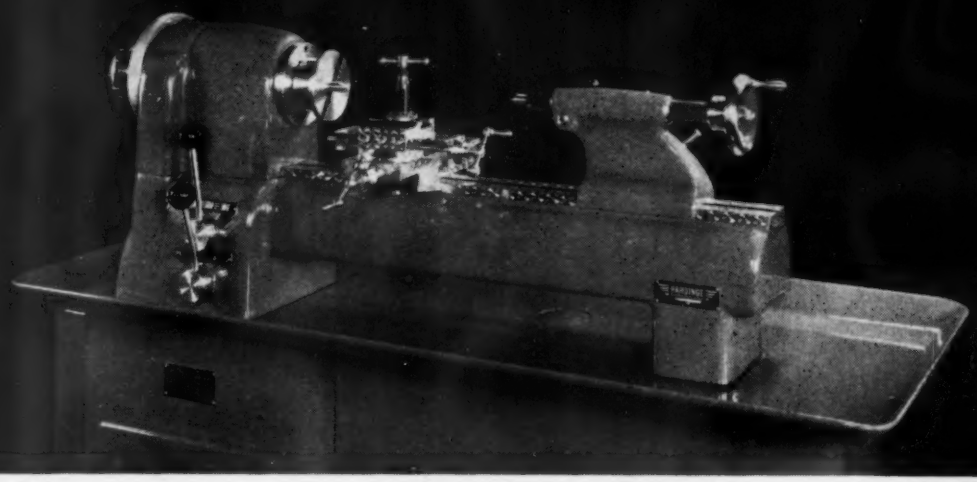
☆ BUY WAR BONDS ☆

General Electric Company, Air Conditioning and Commercial Refrigeration Divisions, Section 4311, Bloomfield, N. J.

Air Conditioning by

GENERAL ELECTRIC

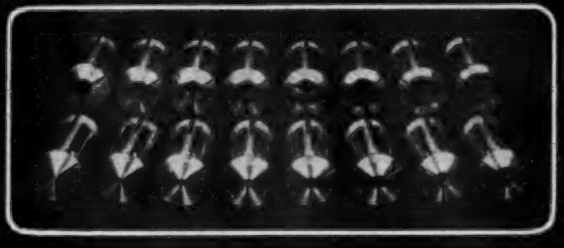
Hear the General Electric Radio Programs: The "HOUR OF CHARM," Sunday 10 P. M., EWT, NBC..."THE WORLD TODAY" News, Every Weekday 6:45 P. M., EWT, CBS



UNUSUAL CAPACITY describes the HARDINGE High Speed Precision Lathe

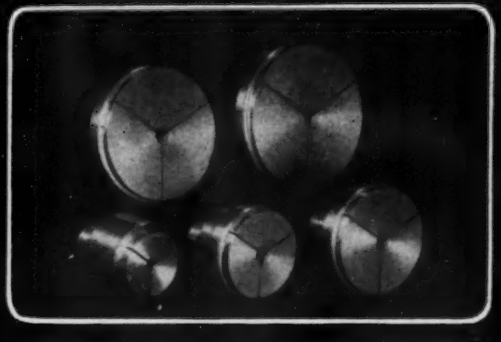
Enthusiastic users are familiar with the precision qualities of the HARDINGE High Speed Precision Lathe. They know the adaptability to a wide range of work. The modern design, preloaded ball bearing spindle construction and ease of operation all contribute to greater efficiency.

1" COLLET CAPACITY



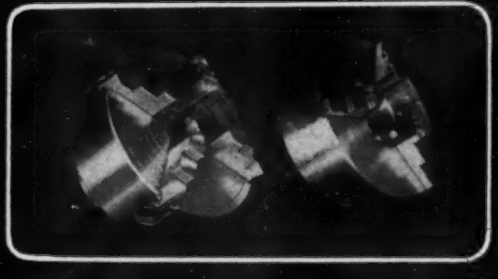
1/16" to 1" in any fractional or decimal size. The set of Collets illustrated is by 16ths only. Special shape and stop type Collets are also furnished.

6" STEP CHUCK CAPACITY



2", 3", 4", 5" and 6" Step Chucks and Closers are used with this machine. These Chucks are operated by the same draw spindle that operates the Collets. Furnished split only – customer applies desired step or steps.

5" JAW CHUCK CAPACITY



Universal and Independent Jaw Chucks applied to the spindle nose have a 5" capacity. The Chucks embody the Hardinge feature of integral mounting which decreases overhang and increases accuracy.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR

HARDINGE
ELMIRA, N.Y.

YOUR MACHINES ARE ONLY

THE INGERSOLL MILLING MACHINE CO.,

AS GOOD AS THEIR CUTTERS

Your machine, regardless of how well designed and equipped in other appointments, gives the best performance only when operated with cutting tools designed for the job.

•

As a natural consequence of meeting and solving many machine problems in milling, Ingersoll has developed a line of milling cutters in types and sizes to suit the conditions of the work. These include cutters for face-milling, end milling, side milling, slotting, channeling, slabbing, form-milling, and many types of boring.

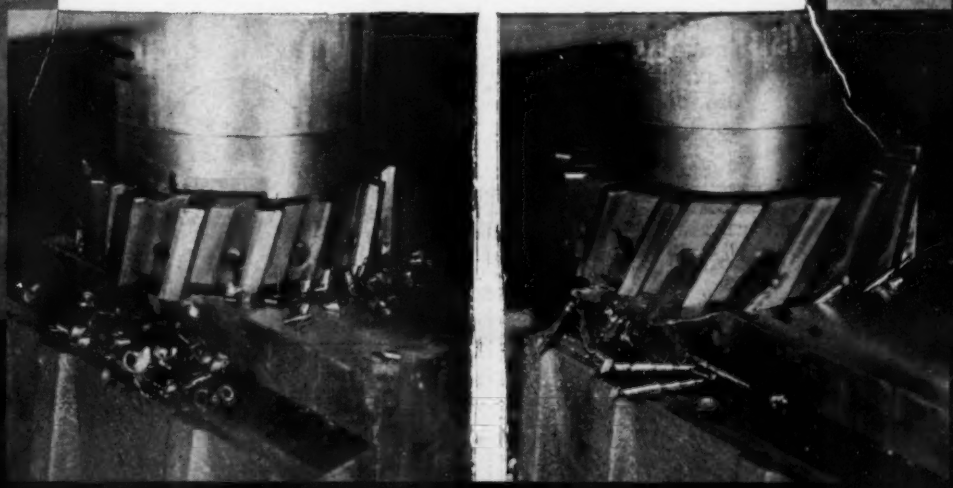
•

If you are not entirely satisfied with the performance of your machines, investigate their tooling. One example of how you may benefit is described at the bottom of this page.

•

In stating the conditions of your work give (1) Kind of material being cut. (2) Width and depth of stock removal. (3) Nature of cut, such as face-milling, slotting, etc. (4) Type of machine drive. (5) And if convenient a sketch of the work-piece.

The same machine was used in both steel milling cuts shown below. The Shear Clear cutter on right, designed for jobs of this type, removed twice the amount of stock in less than half the time. The Shear Clear consumed less power and produced a smoother finish. Are you using the proper cutters in your shop?

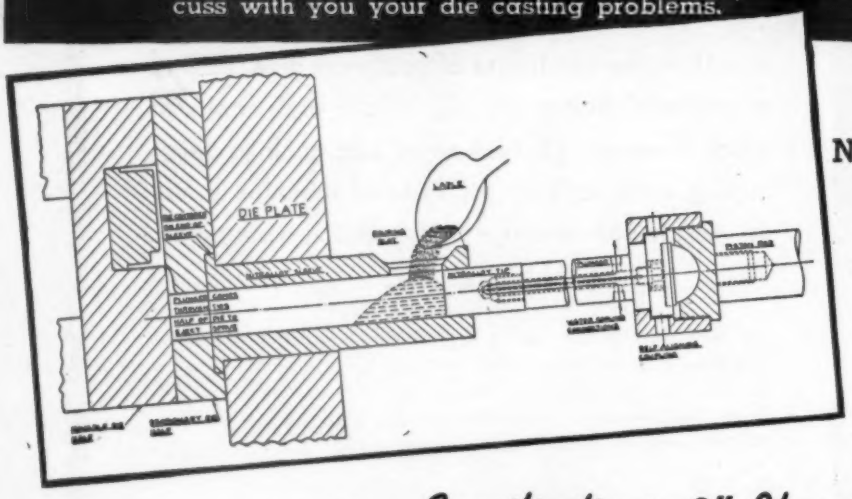


ROCKFORD, ILL.

FOR DIE CASTING ALUMINUM

For production of aluminum castings of uniform density, the Reed-Prentice 1½G Die Casting Machine has been thoroughly proven in many installations. High pressures effectively eliminate all porosity and assure castings of more density and strength. This machine is of the cold chamber type, hydraulically operated, and arranged for both manual and semi-automatic operation.

Reed-Prentice Machines are also adaptable for use with brass and magnesium. Model 1½ for zinc only. Our sales engineers will gladly discuss with you your die casting problems.



PROMPT DELIVERY

No. 1½G Machines available for delivery in early November.

Cut at left shows method of ladling and injecting metal. Die plates are arranged so that automatic ejection of castings and core-pulling attachments may be provided.

Specifications - 2" Plunger

Size of die plates	28" x 29"
Space between bars	15" x 18"
Max. thickness of die handled	18"
Die opens	10"
Locking pressure	130 tons
*Capacity per shot	25 cu. in.
*Pressure on metal	9,000 lb. per sq. in.

* Capacities and pressures can be varied, dependent on diameter of plunger used, up to 2½".

BRANCH OFFICES
1213 W. 3rd. St.
Cleveland. Ohio
75 West St.
New York City. N. Y.

REED-PRENTICE CORP.

MAIN OFFICE
WORCESTER
MASS. U. S. A.

The bird that is its own mother!

THE FABLED PHOENIX lives for 500 years. At the end of that time, it builds itself a nest in the branches of an oak or the top of a palm tree. After the funeral pyre is complete with cinnamon, spikenard and myrrh, the phoenix sets the nest on fire and burns itself alive.

From its body, or its ashes, a young phoenix issues forth, destined to live another 500 years. When it is strong enough, it carries the nest—its own cradle and its parent's coffin—to the temple of the Sun.

We think the modern parallel to this story is even more interesting, **because it's true!** Did you know that machine tools are the mothers of machines? They are the only things made by man that can reproduce themselves. And it's fortunate for us they can, because machine tools are a measure of the degree of civilization of a country.

Machine tools are the foundation of all modern industrial production. They are not only essential for the manufacture of every class of engine and kind of mechanism, but every manufactured product—metal goods, textiles, foodstuffs, scientific instruments, building materials—all must be built on machine tools or on a machine constructed with their help!

In the post-war era, Cone Multiple Spindle Automatic Lathes will be even more essential than they are now. Their unique advantages of departmentalized control will be available to industry to help bring us all better living than we have ever known before.

CONE Automatic Machine Company, Inc., Windsor, Vermont

. . . we see your need for the

WILDER PROJECTOR

To defer checking of work until final inspection has been made is to run the risk of ultimate rejection with attendant losses in time and materials. Why take such chances when you can keep a constant check on tolerances at each step in production, quickly, easily and accurately by means of the WILDER PROJECTOR. Demands for closer and closer precision dictate the need for this tried and proved optical device for checking work in progress and comparing objects by means of a magnified image.

FACTS ABOUT THE WILDER PROJECTOR

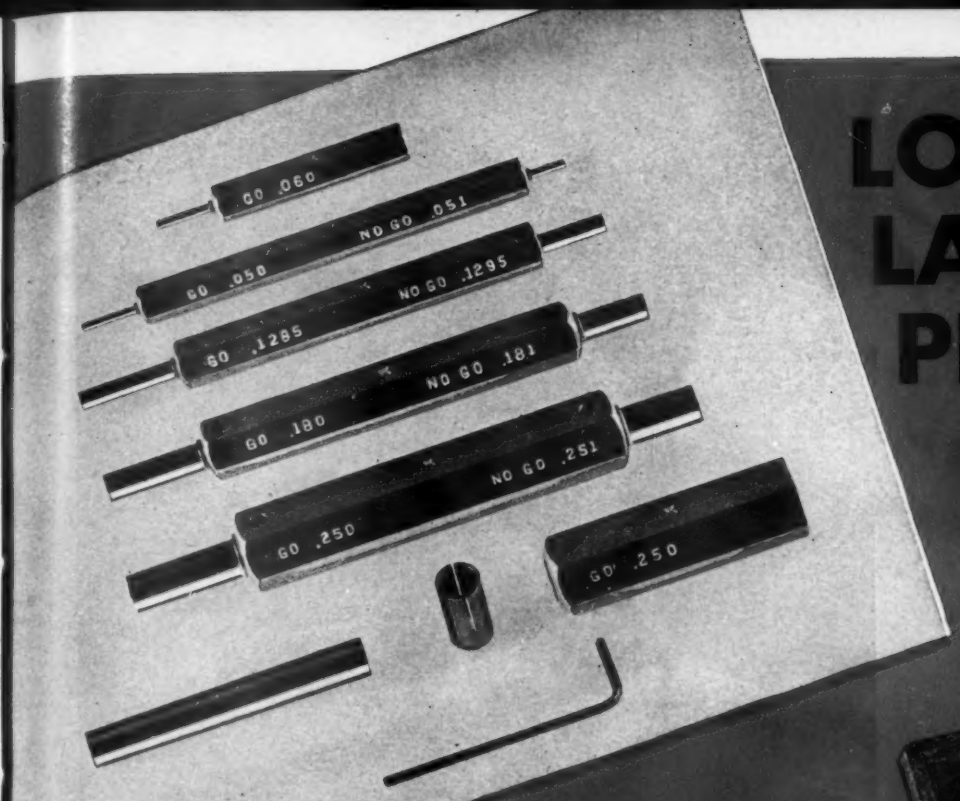
. . . provides wide utility at low initial cost . . . eliminates spoiled work . . . easy to operate . . . highly effective in checking threads, tools, gauges, verifying tool settings, checking up and controlling tool wear . . . provides means for inspecting finished product against specifications . . . effectively magnifies inaccuracies (ordinarily invisible to the naked eye or not detected by gauges) making them quickly and visibly detected . . . speeds inspection, assures accuracy and eliminates guesswork.

Write for bulletin giving complete detailed information.

SPECIFICATIONS

Standard Magnifications — 10X to 100X
Space occupied — 21" x 24"
Height — 18½"
Depth (below bench) — 20"
Size of Screen — 10½" x 16"
Size of Cross Slide Stage — 6" x 5"
Capacity between centers — 5"
Maximum Swing of Centers—2½"

GEORGE SCHERR CO.
INCORPORATED
124 LAFAYETTE STREET, NEW YORK 13, N. Y.



WIRE TYPE PLUG GAGE SET No. 60. These gages provide an accurate means of measuring small holes and also standards for checking twist drills in sizes from 1 to 60. (.228" to .040" dia.)

LONGER LASTING PRECISION

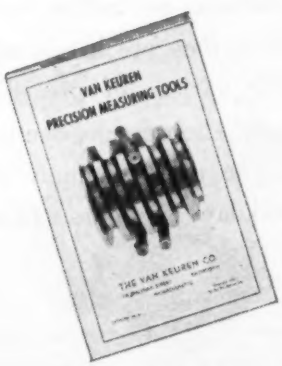
On Small Hole Measurements

Van Keuren WIRE TYPE PLUG GAGES

Taper insert plug gages in small sizes cost a lot per unit of usable surface. Van Keuren Wire Type Plug Gages give longer lasting precision because the entire 2" length of the gaging unit can be used. Split bushings and headless set screws clamp the wire units securely in the handle. When a unit becomes worn it may be ground off and a new section moved out.

All Van Keuren Wire Type Plug Gages are made to a standard tolerance of +.00005" —.00000" on Go units; ±.000025" on No Go units. Closer or wider tolerances can be supplied if desired.

Van Keuren Wire Type Plug Gages are but one of the many types of measuring equipment in which we specialize. Write for Catalog 31 describing our complete line. More than a catalog! . . . It is a valuable handbook of precision measuring methods.

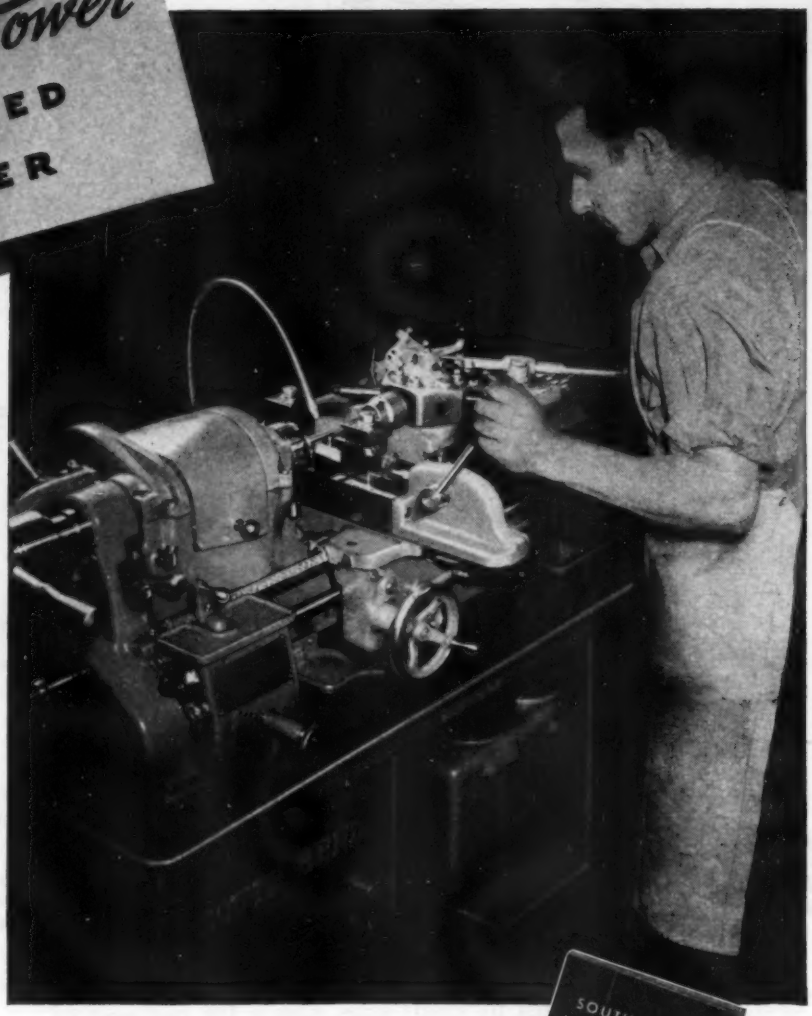


THE Van Keuren CO., 176 WALTHAM ST., WATERTOWN, MASS.

24th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles

MORE *Producing Power* FOR SKILLED MANPOWER



Skilled manpower is one of the most critical of all our strategic resources. To give our fighters the added striking power of more and better weapons, our skilled workers need the producing power of more efficient tools.

Machine tools that are inefficient because they are hard to operate, inaccurate, or incapable of delivering the required speeds are wasteful of critical manpower. Wasted manpower is lost production—and victory jeopardized!

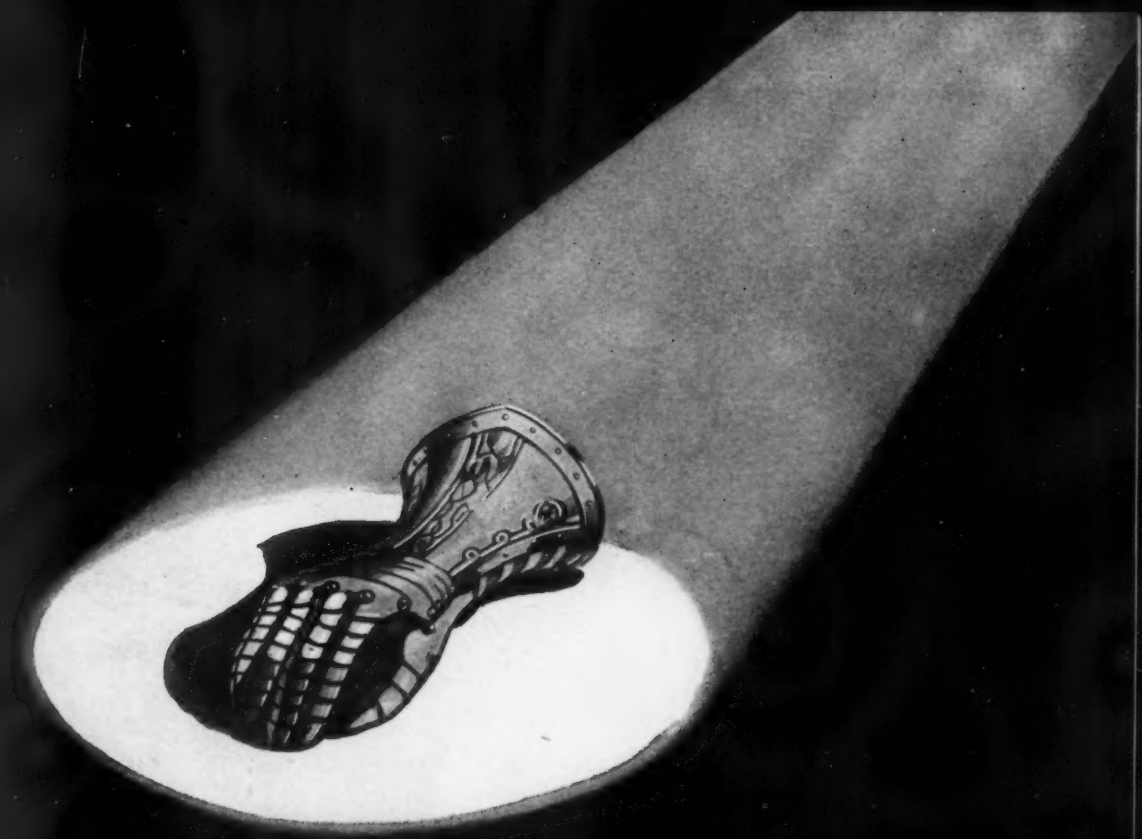
Give your skilled manpower more producing power with South Bend Lathes. Designed and built to deliver maximum production with minimum effort, they are highly efficient on a wide variety of precision machine work. Their ease of operation reduces fatigue and seemingly shortens the workday by hours. This is accomplished through conveniently placed, smoothly operating controls—clear-cut, easy reading graduations—fully enclosed design with no exposed pulleys, belts, or gears—and dependable precision that permits top speed production, even when tolerances must be held to extremely close limits.

SOUTH BEND LATHE CATALOG

The entire line of South Bend Lathes is described in Catalog 100C. Write for your copy of this new 48 page catalog.

Army — Navy Production Award with Star presented to the South Bend Lathe Works for outstanding war production.

SOUTH BEND LATHE WORKS LATHE BUILDERS FOR 36 YEARS SOUTH BEND, INDIANA



A CHALLENGE TO AMERICANS "WHO GET THINGS DONE"

Right now we are up against the hard, blunt facts of war and the grim necessity of winning it. It's the one thing that matters with no alternative but complete and final Victory.

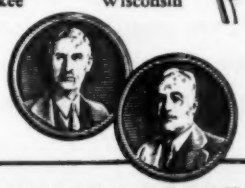
At the same time, it's only natural to wonder about the future—to think about the time that is coming after the last shot in this conflict is fired. And you can be sure that the future will be a challenge. We won't just slip back to the world we knew before hell broke loose.

For winning the peace will call for just about as much all-out effort as all-out production does now to win the war. We will have to do something with our tremendous productive capacity—our vast industrial plants — our skilled workers.

Yes, it will be a challenge to American business ability, the kind of a challenge Americans "who get things done" like —a challenge of their capacity to organize—manage—produce. It will be a new industrial age, an age of new materials, new techniques, new precisions. Supplying the needs of that future will take all that industry can produce and deliver.

Kearney & Trecker Corporation sees that kind of an America in the years after the war and is making its plans accordingly. No matter how long and hard the fight—it's worth it for the America of tomorrow.

KEARNEY & TRECKER
CORPORATION
Milwaukee Wisconsin



KEARNEY & TRECKER
CORPORATION

"Buy Victory with War Bonds"

Milwaukee **MACHINE TOOLS**

A WISE SELECTION OF FEED AND SPEED WILL ADD TO THE LIFE OF A MILLING CUTTER

DUE to an overload on milling cutter manufacturing facilities, cutters in service *must be conserved.* This means that every cutter must be run so as to give its Maximum Useful Life. Only by getting the most out of what cutters you have, can you prevent the necessity for even longer delivery quotations. It is a problem that is squarely up to the users of milling cutters, and especially to the operators and set-up men on milling machines . . . How to do it? There are many ways, so many that no single, simple solution will serve every case. In general, one of the most effective methods of conserving cutters lies in the proper selection of feeds and speeds. Again, no single selection will suit all conditions. Read our Engineering Data Section, Handbook "L", pages 306-311 for basic suggestions. Keep in mind that cutters must be made to last as long as possible without, at the same time, affecting production. Experiment to test the various possibilities. Be intelligently curious! *Your cutters are weapons — get the most out of them!* For help on specific problems, see your Barber-Colman representative, or send facts to us.

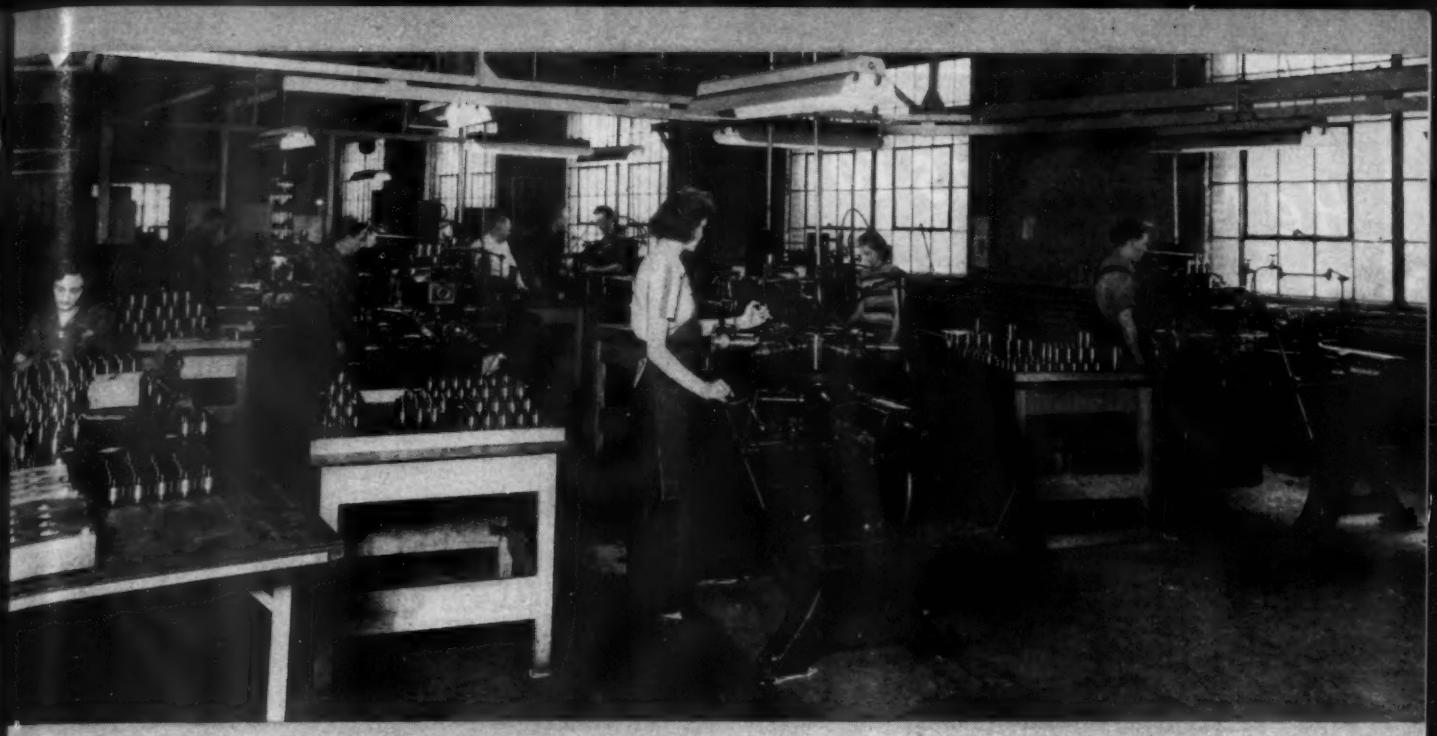
SEE PAGES 306-311

Buy War Bonds

BARBER B-C COLMAN PRODUCTS
HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company

GENERAL OFFICES AND PLANT • 201 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.



Women fill shoes of men called into Service

Cincinnati ACME Universal TURRET LATHES

★

• The constant drain of manpower from industry to the military places the responsibility of war production more and more upon our courageous women.

Users of Acme Turret Lathes find that the women can operate these very efficiently. The ease of operation — simplicity of control — and centralization of all operating levers enable women operators to become expert on these machines very quickly.

On the Acme Lathe in the center of the illustration the woman operator is doing a fine job — maintaining the desired tolerances and required production with apparent ease.

If you have a manpower problem you can solve it with an Acme Universal Turret Lathe and a woman operator.

The ACME MACHINE TOOL CO., CINCINNATI, OHIO

He Never Has to Take His Eyes Off the Cutter and Work

DEVLIEG JIGMIL

Spindle start, stop and reverse—

Power vertical feed and rapid traverse movement—

Power horizontal feed and rapid traverse movement—

Power automatic table retraction and repositioning—

Power feed and rapid traverse to bar movement—

are all carried in a master switch on the spindle head—at the operator's finger tips.

Thus, the operator of the DeVlieg Jigmil can fix his vision on the cutter and work—never has to look at controls during operation.

The Jigmil is what a machine tool should be—a powerful and accurate extension of the operator's hand. The value in precision boring and milling is apparent.

It's a* NEW *Type Machine

Spacing Accuracy of a Jig Borer . . . Performance Qualities of a Milling Machine . . . Convenience and Flexibility of a Horizontal Boring Mill.

New speed of operation . . . New standards of excellence of bored holes . . . New accuracy in milling . . . Automatic table retraction and repositioning dependable within .0002".

Many machines show 75% greater average daily productivity.

Write for Circular

DEVLIEG MACHINE TOOLS

DE VLIEG MACHINE COMPANY

450 FAIR AVENUE, FERNDALE DETROIT), MICHIGAN

INSIDE STORY

New Free Bulletin Shows You How

GREEN operators become COMPETENT inspectors

"Feel" errors are ELIMINATED

ALL okay parts are passed; ALL out-tolerance parts are rejected

Work is checked with LABORATORY precision either at the machine or in final inspection

THERE is no argument over rejected parts when P&W Electrolimit Comparators take over. You set up the required limits with master gages, and from then on the parts are either right or wrong. The gage picks up any error and magnifies it electrically up to 20,000 times. That error becomes a large needle movement across a dial . . . so easy to read that even the rawest industrial recruits have no trouble. Pratt & Whitney Electrolimit Comparators have made history in the war effort, and will do the same thing some day in the peace to come.

JUST PRINTED: the new bulletin illustrated above — "P&W Electrolimit Internal Comparators" — tells the "inside story" . . . the facts about fast precision checking of holes. A companion piece covering P&W Electrolimit *External* Comparators is also available. Either or both will be sent promptly to company executives who request it on their own letterheads.

PROMPT DELIVERY

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD • CONNECTICUT

Pre-War Speed in Delivery

CADILLAC
Thread Plug
GAGES

ALL STANDARD SIZES

National Fine
National Coarse
0-80 to 1½-6

WHEN you order Cadillac Standard Thread Plug Gages, you get the same speedy delivery as in pre-war days—immediate shipment on rush orders, and 24-hour shipment on all others.

This is because our plant is devoted exclusively to the production of this type of gage. Consequently, except on extremely rare occasions, our stock is always adequate to meet all normal demands for any standard size from 0-80 to 1½-6, National Fine or National Coarse—also pipe plug gages ⅛ to 1¼.

And remember, in Cadillac Gages "top quality" in materials and workmanship goes hand in hand with "top speed" in delivery. Send us an order covering your immediate requirements. If you must have overnight shipment, wire us.

CADILLAC
THREAD GAGES
CADILLAC

CADILLAC GAGE COMPANY, Detroit

"PUT IT ON THE BLANCHARD"

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- Production
- ★ Adaptability
- Fixture Saving
- Operation Saving
- Material Saving
- Fine Finish
- ★ Flatness
- ★ Close Limits

★ . . . . . *Especially valuable on jobs like the one illustrated.*

HERE are two surface grinding problems that came to the Blanchard Engineering Department in one week:

(1) Grind a hardened steel ring 86½" in diameter to a tolerance of ±.0002" for thickness.

(2) Grind the edges of a steel strip, .005" thick, .125" wide, and 20" long, straight and to a tolerance of ±.0005".

Thirty years experience in grinding flat surfaces enabled Blanchard Engineers to solve the grinding of both of these jobs, using Blanchard vertical Surface Grinders and Blanchard Grinding Wheels.

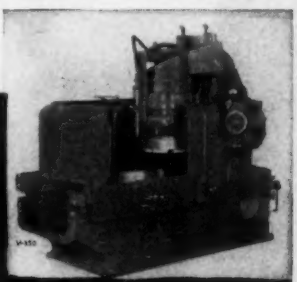
If you have work which lies within the range here indicated, you should investigate the possibilities of a Blanchard.

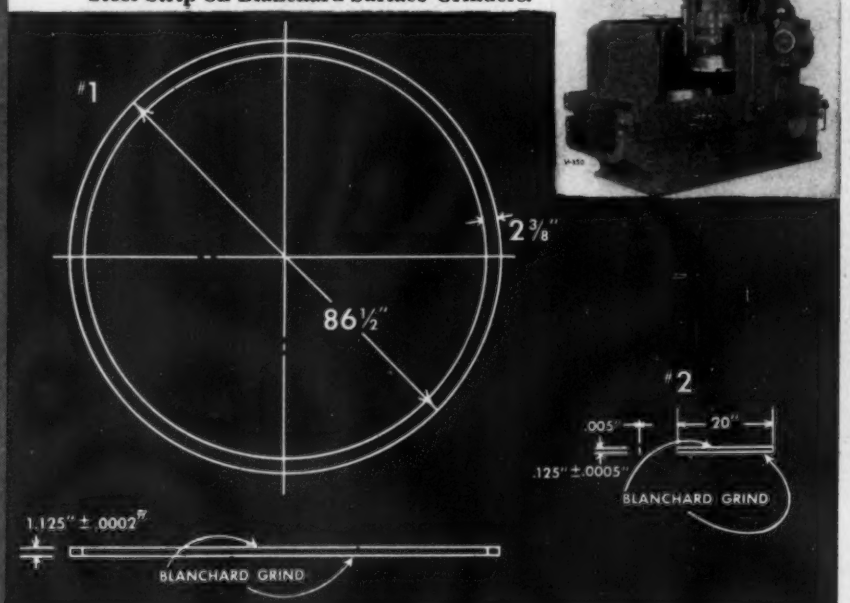
Whether the job is large or small, usual or unusual, Blanchard can show you how to grind it better and faster.

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE, MASS.

Grinding Hardened Steel Rings and Edges of Steel Strip on Blanchard Surface Grinders.

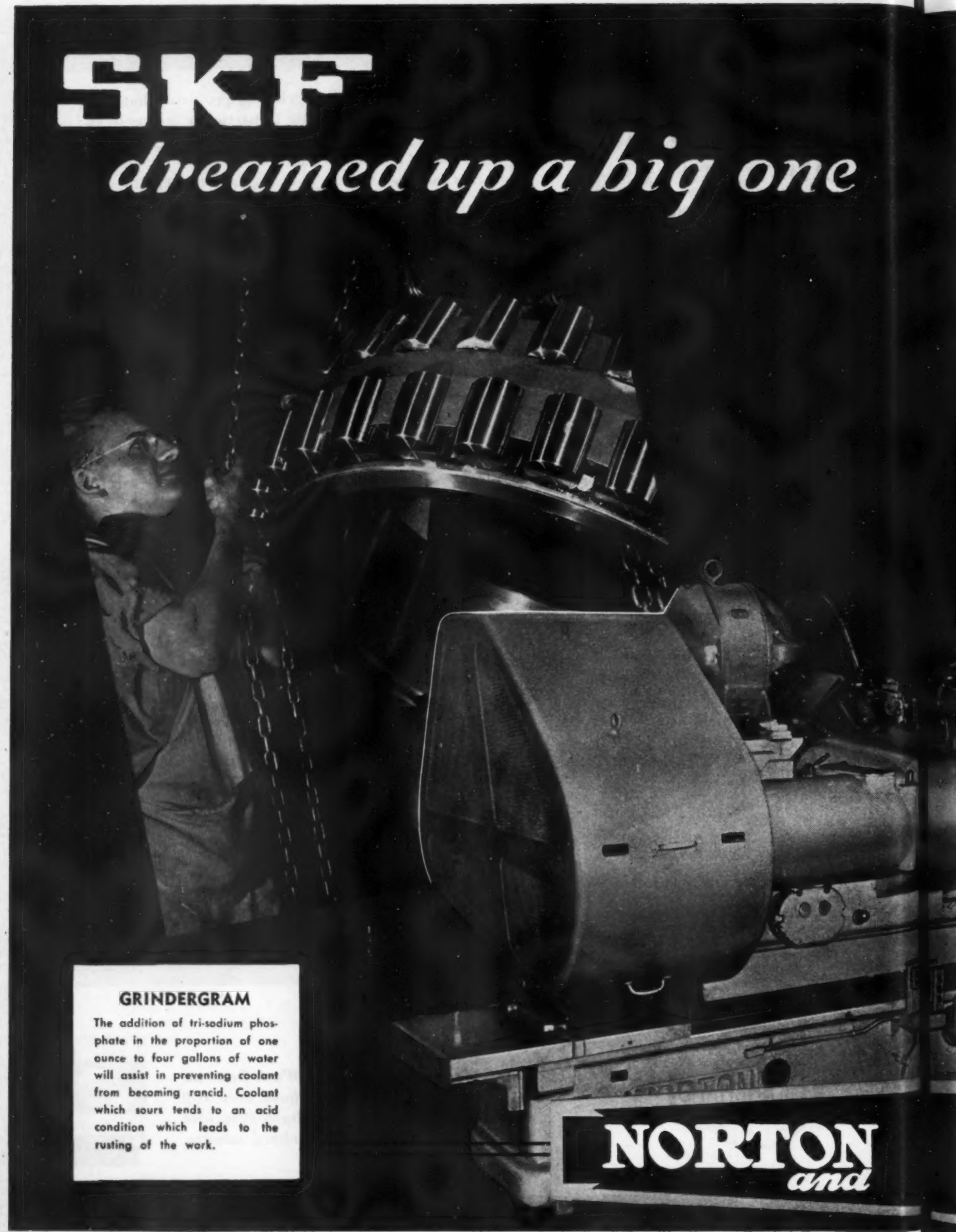




BLANCHARD

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

SKF
dreamed up a big one



GRINDERGRAM

The addition of tri-sodium phosphate in the proportion of one ounce to four gallons of water will assist in preventing coolant from becoming rancid. Coolant which sours tends to an acid condition which leads to the rusting of the work.

NORTON *and*

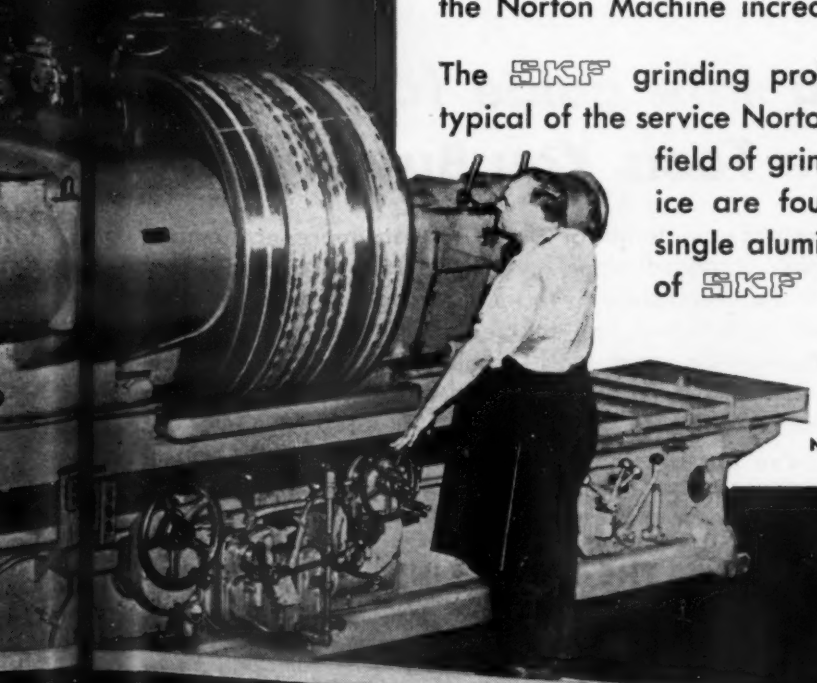
and NORTON BUILT A GRINDER TO MAKE IT POSSIBLE

THE roll neck bearings of the huge mills producing sheet aluminum in quarter-mile-long strips are really *big* ones.

To insure that this production of the light, bright metal—vital to the Nation's growing air supremacy — continue uninterrupted, SKF expanded its production of the smooth-running SKF Spherical Roller Bearings. Part of this expansion program included an extra-capacity Norton Grinder large enough to finish two 48-inch bearing outer races in a single set-up.

"It has taken large-scale engineering imagination to develop these huge bearings, and the machines and the methods of producing them," comments SKF in reporting that the Norton Machine increased production 600%.

The SKF grinding problem and its happy solution is typical of the service Norton Company renders in the entire field of grinding. The rewards for such service are found in the statement — "Not a single aluminum mill has been idle for want of SKF bearings."



NORTON COMPANY
Worcester 6, Mass.
New York - Chicago - Detroit - Cleveland - Hartford

GRINDERS
Lappers

PAST PERFORMANCE

...a safe guide for "The Tools You Buy Again"

Actual results — in terms of better, faster, more economical work—make standardization on UNION TOOLS a logical procedure and a sound policy. Years of specialization in development and manufacture has enabled UNION to produce long-lived, dependable small tools — tools that help keep production moving at maximum speed and accuracy at a minimum of expense.

Once you've put UNION tools to work, they'll be the "Tools You Buy Again." Performance will have been the basis for your choice.

UNION TWIST DRILL CO.
Athol, Mass.

STORES New York Store: 61 Reade St.; Los Angeles Store: 524 East Fourth St.; Chicago Store: 11 So. Clinton St.; Seattle Store: 568 First Ave., So.; San Francisco Store: 121 Second St.; Detroit Store: 6540 Antoine St.

MANUFACTURING DIVISIONS

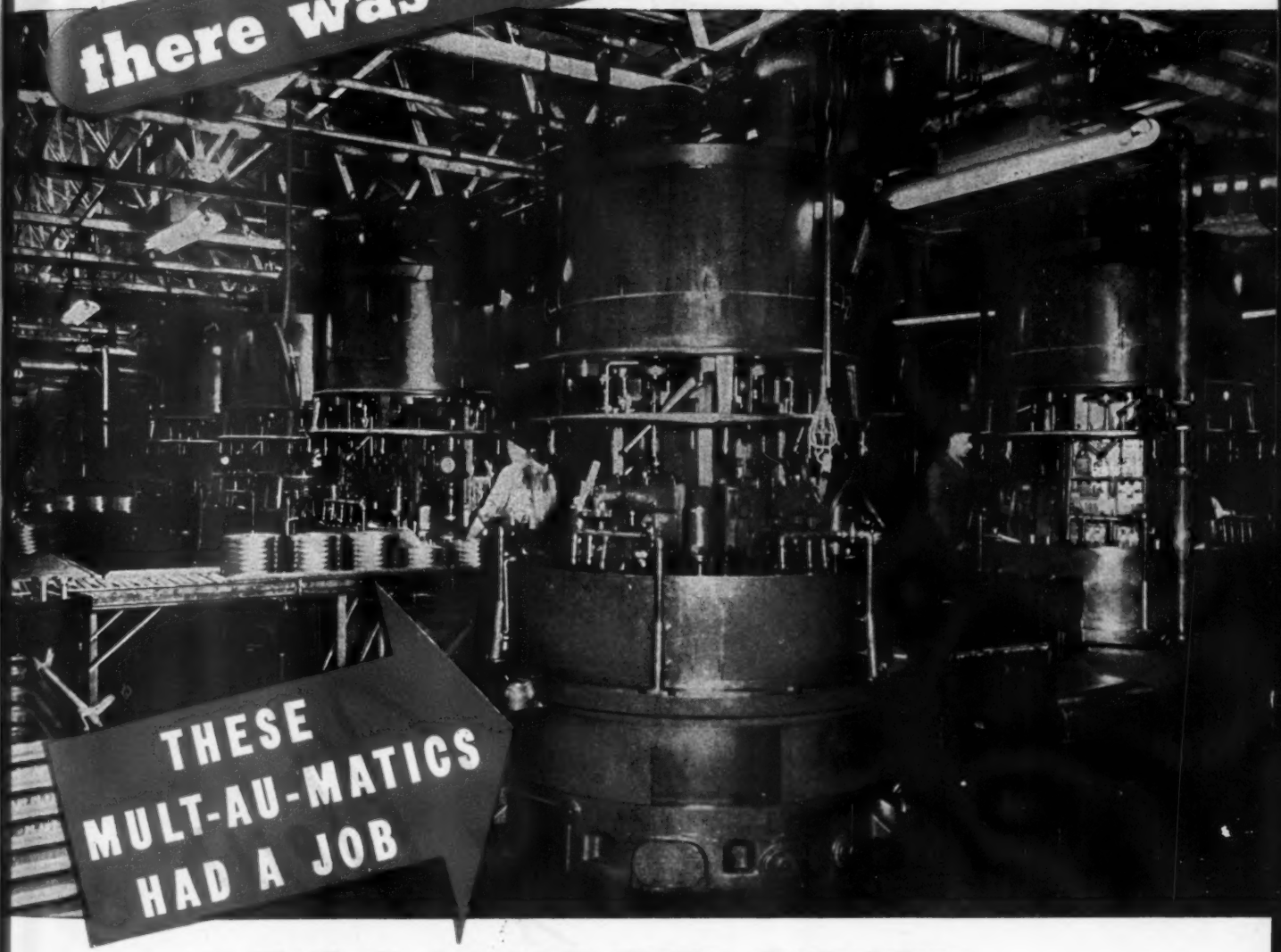
S. W. Card Mfg. Co., Div.; Mansfield, Mass.
Butterfield Division, Derby Line, Vt., and Rock Island, Quebec

THE UNION LINE

Twist Drills — Milling Cutters — Reamers — Hobs — Slitting Saws — End Mills — Taps — Dies — Screw Plates — Profile Cutters.

UNION

EVEN WHEN there was PLENTY of manpower



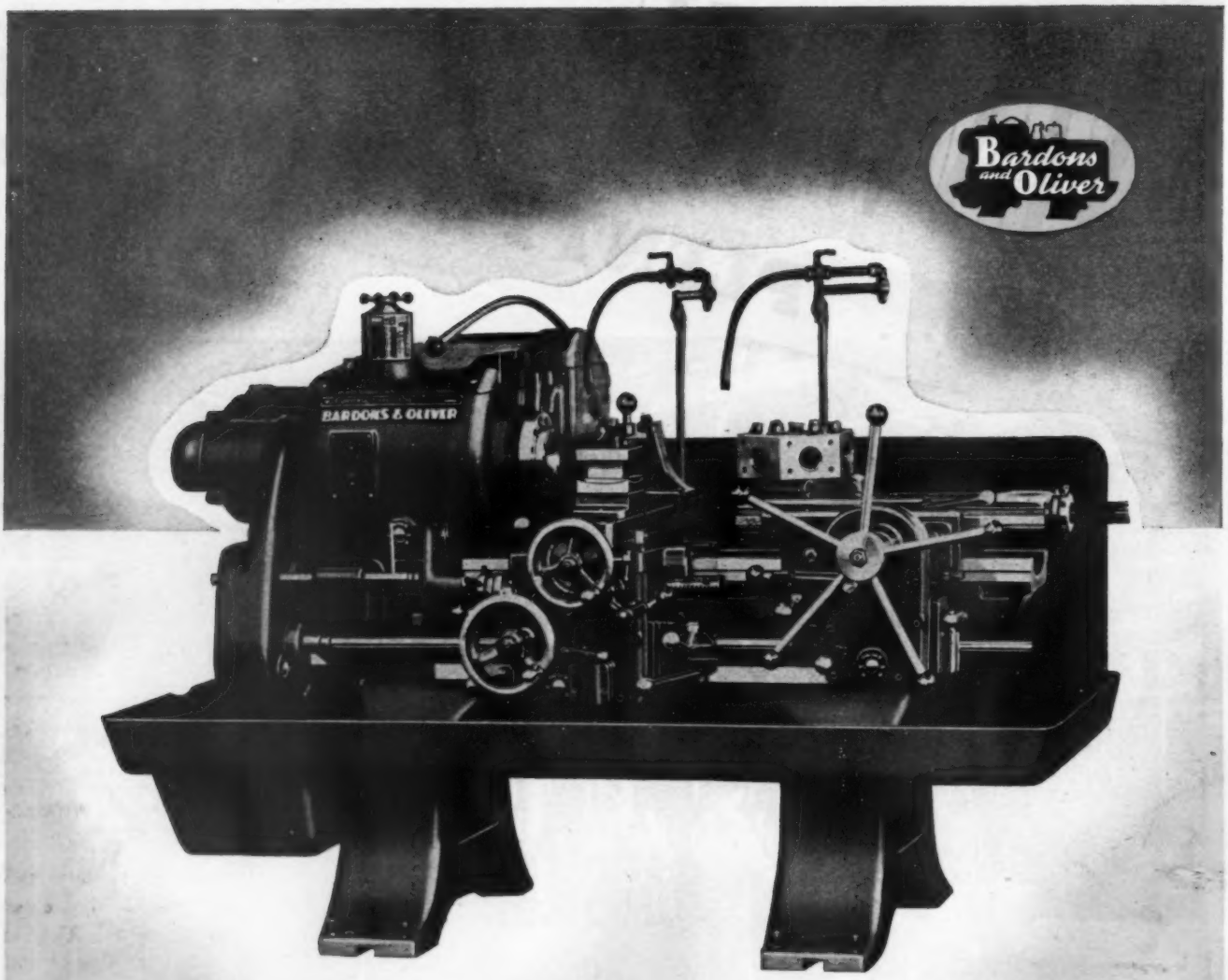
NOW — THEY'RE BUSIER THAN EVER

The battery of Mult-Au-Matics you see here has been steadily at work since 1938. It has made many different automobile parts for its maker. Right now, it is helping to build well-known airplane engines.

The point to notice is this: *Every Mult-Au-Matic in service replaces several single spindle machines.* Since their higher output and lowered production time made them profitable even when there was no manpower shortage . . . wouldn't it pay you today to get a Mult-Au-Matic time-study for your most urgent jobs?

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT



Something New

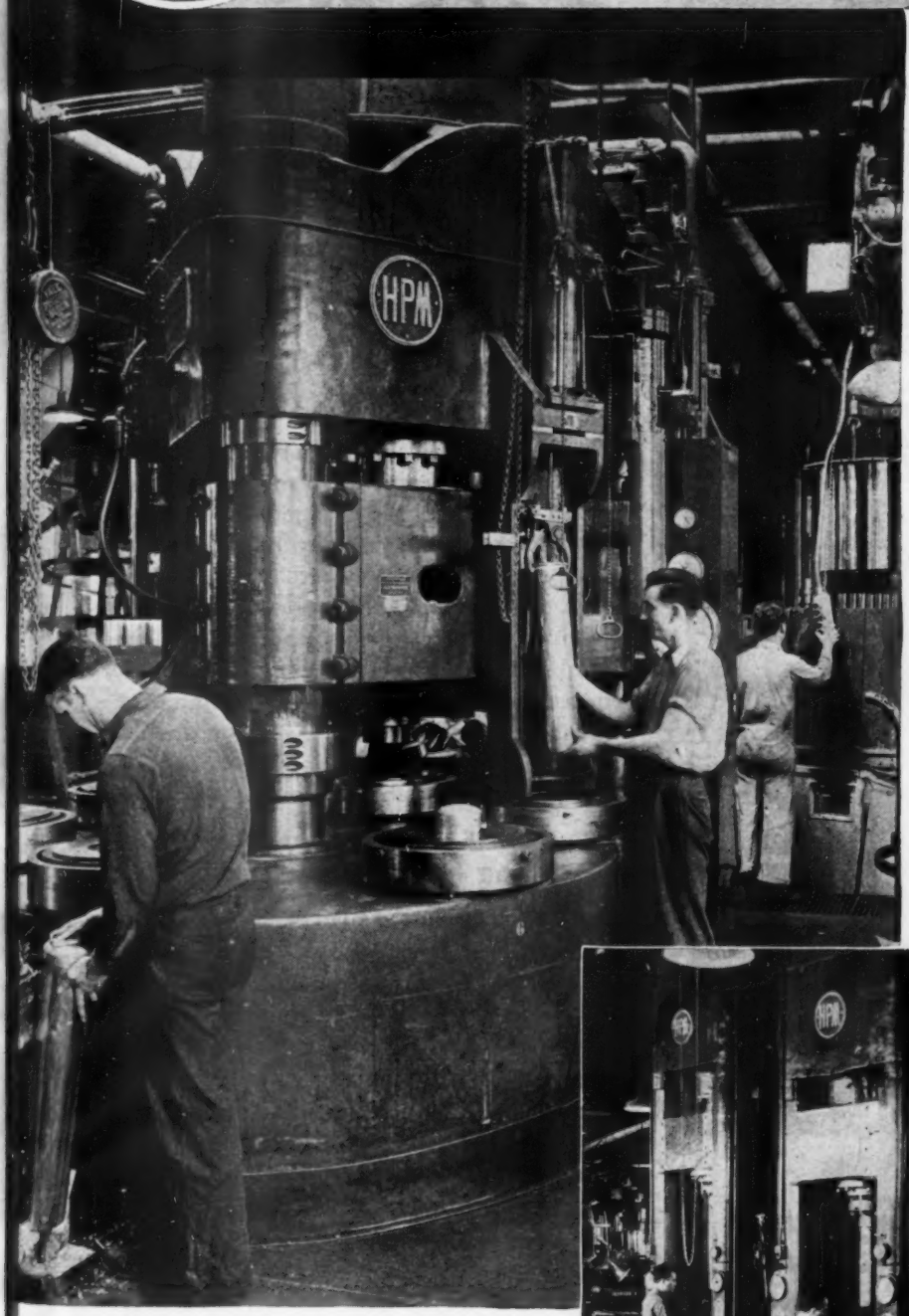
HAS BEEN ADDED

MANY RECENT IMPROVEMENTS have been made in Bardons & Oliver Turret Lathes . . . Ask our representative to give you all the details . . .

BARDONS & OLIVER, INC. 1133 W. 9th STREET CLEVELAND, OHIO

Final Victory assured by

HPM "All-Hydraulic" FASTRAVERSE CARTRIDGE CASE PRESSES!



H-P-M FASTRAVERSE presses are establishing new records in the production of artillery shell cases. There are H-P-M presses for cupping, drawing, redrawing, heading and tapering operations, regardless of the size of the shell case. Each press is designed for high speed operation, and employs the H-P-M closed circuit operating system, permitting valveless and shockless reversal. H-P-M presses are completely self-contained, each being equipped with an H-P-M HYDRO-POWER radial hydraulic pump.

If your production includes pressure applications—*write for details.* An H-P-M FASTRAVERSE press will do the job faster and cheaper.

THE HYDRAULIC PRESS MFG. CO.

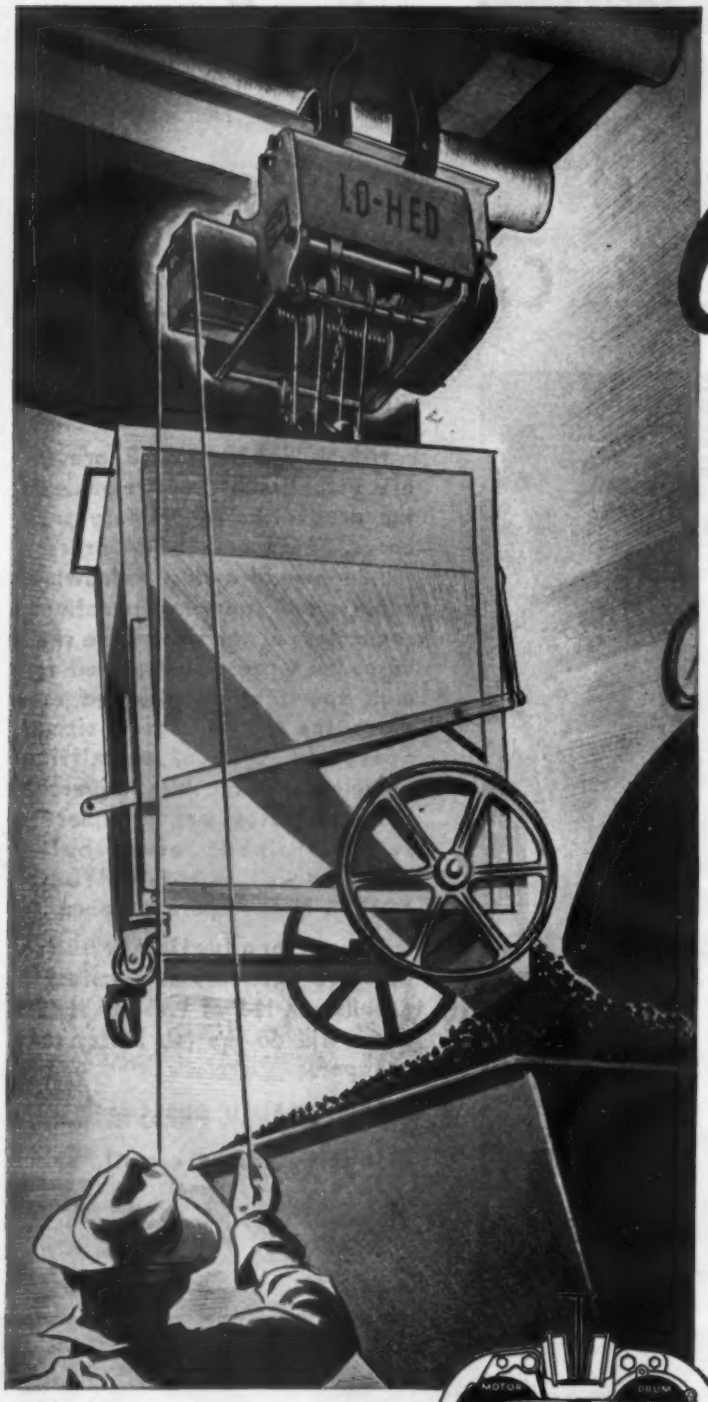
Mount Gilead, Ohio, U. S. A.

District Sales Offices: New York, Syracuse, Detroit and Chicago — Representatives in Principal Cities

Above—A 2000-ton H-P-M cartridge case heading press equipped with a six station turret, permitting continuous production. Press will accommodate two heading tools which can be automatically operated in sequence.

Right—H-P-M FASTRAVERSE cartridge case presses drawing large artillery shell cases.

All presses illustrated are installed in the plant of one of America's largest producers of artillery shell cases



ONE MAN DOES WORK OF 2

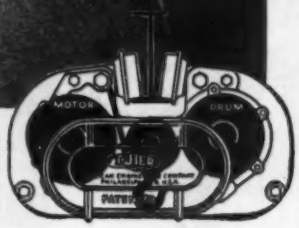
When he gets a lift with a LO-HED HOIST

Here's a good example of what a Lo-Hed Hoist and American ingenuity will do to ease a man-power problem. In this boiler room you'll find no messy coal pile on the floor, no man shoveling all day into the stoker hopper. Coal is wheeled into the boiler room in a tidy little cart, lifted by a Lo-Hed and dumped into the stoker hopper. Lo-Hed does the brute work, frees the engineer for other necessary boiler room duties and maintenance jobs. If this illustration gives you an idea, write or telegraph for full information about a Lo-Hed Hoist suitable for your requirements.

LO-HED IS THE "BALANCED" HOIST FOR HEAVY DUTY SERVICE

The *balanced* arrangement of motor and drum in a Lo-Hed Hoist allows the hook to be pulled up until it almost touches the beam—a desirable plus feature for which you pay no premium. This same arrangement makes possible the use of an all spur gear drive from motor to drum.

Other important features of the Lo-Hed Hoist are the heavy duty hoist motor; strong, short shafts; high duty bearings; 100% positive automatic stop; and removable protective covers for all vital parts.



The Lo-Hed Hoist can be adapted for operation on any monorail system. There's a Balanced Lo-Hed Electric Hoist for Every Purpose.

Other A-E-CO Products:
TAYLOR STOKERS • MARINE DECK AUXILIARIES • HELE-SHAW FLUID POWER

AE CO 75th ANNIVERSARY

AMERICAN ENGINEERING COMPANY

2407 ARAMINGO AVENUE
PHILADELPHIA, PENNA.

crippled crane

REJUVENATED BY WEEK-END OPERATION..

ASSEMBLY AISLE OF ARSENAL LEFT WITHOUT CRANE FACILITIES WHEN 100 HP MOTOR-ARMATURE FAILED. ARMATURE DELIVERED TO WESTINGHOUSE DISTRICT MANUFACTURING AND REPAIR PLANT 6:00 P.M. SATURDAY. ARMATURE STRIPPED AND REWOUND, COMMUTATOR REBUILT. ASSEMBLY DIPPED AND BAKED, BALANCED AND TESTED. BACK AT THE ARSENAL 2 P.M. TUESDAY.

Westinghouse

DISTRICT MANUFACTURING AND REPAIR

J-90491

IF **THE EQUIPMENT NEEDING REPAIR IS VITAL TO THE WAR EFFORT . . . PHONE THE NEAREST OFFICE OF WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY FOR**

EMERGENCY SERVICE

33 M & R PLANTS . . . ONE NEAR YOU!

...then perhaps he said to himself

A TEN-MONTH DELIVERY

MR. ROOSEVELT'S LETTER

President Roosevelt's letter to Mr. Churchill read as follows:

Dear Mr. Prime Minister:

When you were with us during the latter part of December, 1941, and the first few days of 1942, after we had become active participants in the war, plans for a division of responsibility between your country and mine became generally fixed ... well as in other matters, we agreed that mutual advantages were to be gained by concentrating, in so far as it was practical, our energies in doing those things which each of us was best qualified to do.

Here in this country in abundance were the natural resources and critical materials.

Here we had waiting cargoes to be moved in ships to your land and to other theatres. If your country was to have carried out its contemplated shipbuilding program it would have been necessary to move tonnages of raw materials ... we have here across the Atlantic to your mills and ... and then, in form of ... ships, to send them back ... ports for the cargo ... waiting to be carried.

Materials and Time ...

Obviously, this would ... tailed a waste of mate... time.

It was only natural ... to decide that this ... be the predominant ... area for us ... try was to ... resou... instruc...

Our merchant ... larger and with ... at a rapid ... ever-increasing ... sels we fore... ties of no ... your side the ... fleet has ... you have in ... sequence ... licensed ...

Clearly ... gant were ... enced men ... used as ... fail to ... a wastage ... side and ... portance ... facilities.

Here there had been developed a welding technique which enables us to construct standard merchant ships with a speed unequaled in the history of merchant shipping.

BIG PIECE OF NEWS the Prime Minister read to the House of Commons—the 10-months' delivery of a couple hundred ships.

Again the old formula: BIG name in the NEWS . . . made big by Big Production . . production made big by RECOURSE TO ARC WELDING (remembering Webster's short definition of RECOURSE as "a going to for aid or protection").

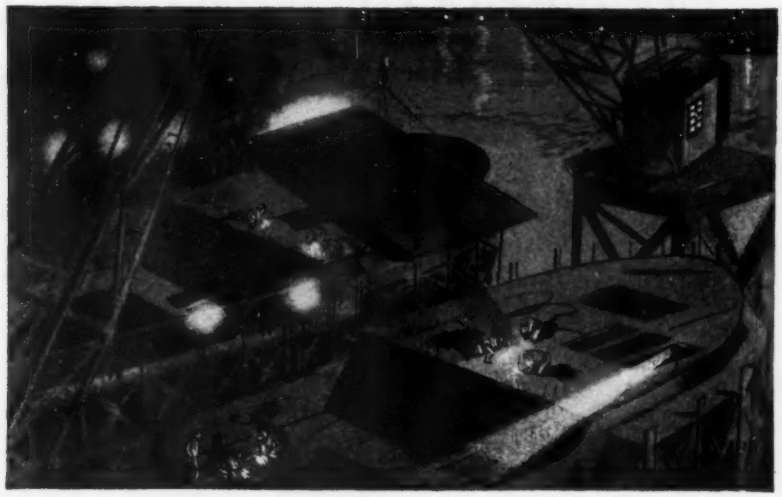
So the President has written the formula into the history of the world: "Here there had been developed a welding technique . . . with speed unequaled."

THE LINCOLN ELECTRIC COMPANY • CLEVELAND 1, OHIO

"A Welding Technique" *he said*

★ ★ ★ ★ *"with speed unequalled in the history of merchant shipping"*

...and this, Mr. Prime Minister, is what he meant:



SHOP FABRICATION. Ships welded on a production line by assembly line methods—faster welding by positioning the welding—pre-fabrication of large sections—upside-down assembly—dozens of short-cuts make up this technique, recourse to which has revolutionized shipbuilding.

MASS PRODUCTION. If ships can be put on a mass production basis, think of the speed and economy in producing products less bulky. If speed alone were the only benefit of welding, *recourse* to it might be debatable. But consider these additional benefits:

LESS STEEL
On these 200 ships, *recourse* to arc welding saves 375,600 tons. Steel is critical. Steel costs money.

LESS HULL FRICTION
A welded Liberty ship leaving New York would reach Sicily 40 hours quicker than its rough-skinned sister of equal horsepower.

INCREASED CARGO
18% more cargo carrying capacity is provided by weight-cutting through *recourse* to arc welding.

America's greatest natural **recourse**

ARC WELDING

This New Publication tells how to *Choose and Use*

TAFT-PEIRCE THREAD SNAP GAGES

Here, in one brief and easy-to-read bulletin, are set forth the advantages of both types of thread snap gages:

ADJUSTABLE Thread Snap Gages of the rectangular crowned-anvil type originated by Taft-Peirce . . . with the exclusive advantage of a true form of thread ground into the anvil face.

ROLL Thread Snap Gages now made by Taft-Peirce under the John-Sons patents, with either open or closed faces . . . with gaging rolls of several lengths, and for any pitch and diameter.

Adherents of each type of thread snap gage will find in this new bulletin all of the information necessary to enable them to order the right gages for their work . . . plus helpful instructions on how to get the best results in gaging, and how to keep their gages in serviceable condition. For *your* copy of the Taft-Peirce Thread Snap Gage Bulletin, write a note on your letterhead today.

ARMY (E) NAVY

The first star has been added to the T-P flag for continued Excellence in war production

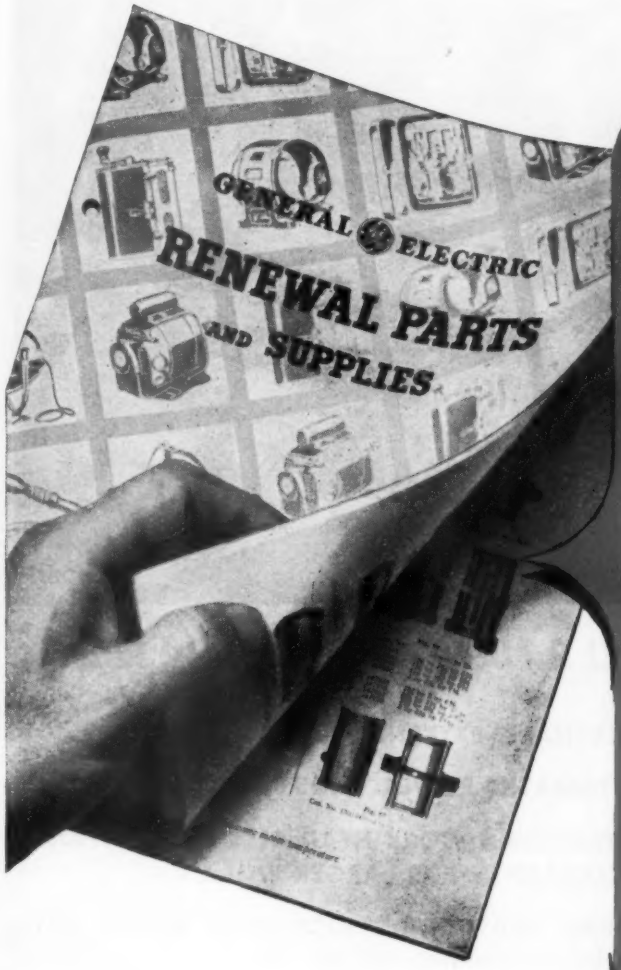
THE

TAFT-PEIRCE

MANUFACTURING COMPANY

Woonsocket, Rhode Island

READY! Simplified Catalog of G-E Renewal Parts



HELPS GET PARTS FASTER

- ✓ Quickly identifies needed parts—pictorially!
- ✓ Simplifies ordering by catalog number
- ✓ Speeds delivery from G-E warehouses or factories
- ✓ Gives dimensions, descriptions, prices on all parts required most frequently
- ✓ Includes parts for G-E motors, control, switchgear and other widely used electric equipment; also supplies, such as magnet wire, insulating materials
- ✓ Makes it easier to order *genuine* G-E parts, for better fit and long-lasting performance

NOW, a single book—indexed for easy reference—can take the place of separate handbooks and bulletins for identifying and ordering most G-E renewal parts needed to keep your equipment in operation. With this book, you'll find it easier to order genuine G-E parts *by catalog number*—saving time all along the line.

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GENERAL ELECTRIC

General Electric Co., Section AE 750-220
Schenectady, N. Y.

Yes, I want a copy of your new 96-page catalog "Renewal Parts and Supplies (GEA-638)" to help simplify ordering of genuine G-E parts.

Name.....

Company.....

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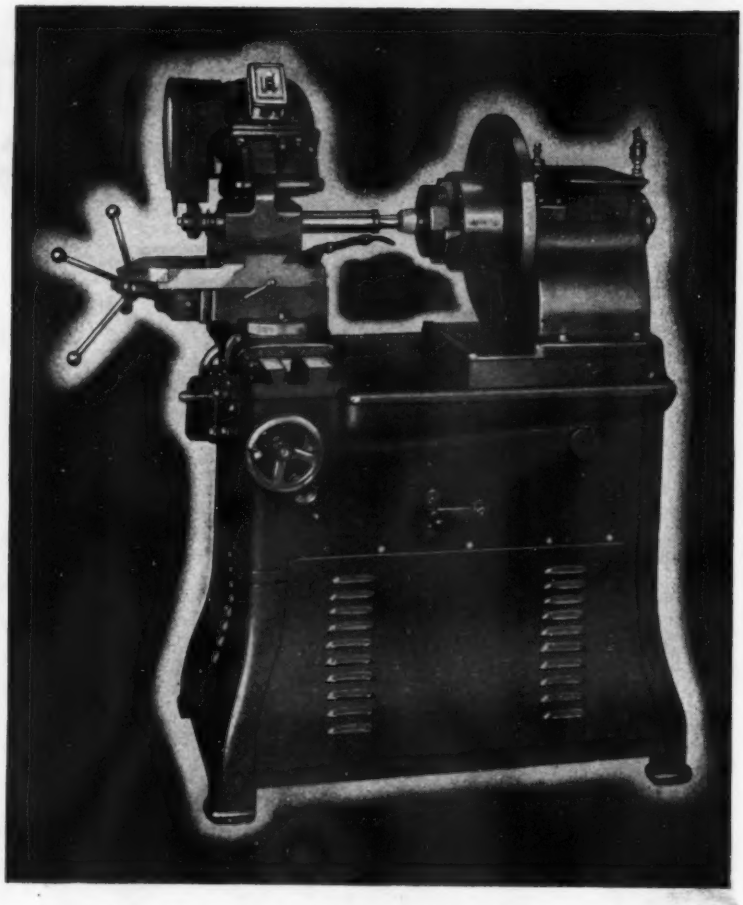
NEW
MODEL ACX

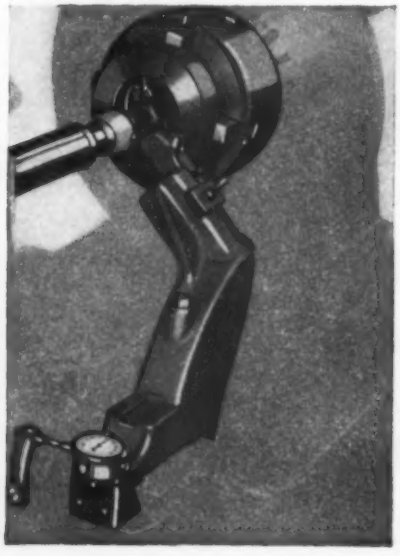
INTERNAL
and
SURFACE
GRINDER



Micrometer screw adjustment on the automatic power cross-feed. Both rack & pinion and screw feed available for longitudinal travel. Mechanical stops prevent spoilage. Jaw or magnetic chucks easily and quickly mounted on face plate by a single draw bar through hollow work spindle. 80 and 130 R.P.M. quick change work speeds; 6,000 and 12,000 R.P.M. spindle speeds. 2 H.P. grinding head motor; ½ H.P. workhead motor—all self-contained. Built-in coolant system easily accessible for clean-out.

TURNS AND GRINDS

- ★ **INTERNAL • EXTERNAL • SURFACE • TAPER JOBS**
- ★ **AUTOMATIC POWER CROSS-FEED**
- ★ **RETRACTIBLE WORK HEAD ALLOWS ADDITIONAL CLEARANCE FOR LARGER WORK**
- ★ **TURNS AND GRINDS SUCCESSIVE PIECES WITHOUT CHANGING SET-UP**



EXCLUSIVE AUTO-SIZER

A big man-hour saver when working on a single operation at high production speeds. Arm with dial indicator sizes directly from work diameter. Exactly duplicates successive pieces on long runs.

PRICE

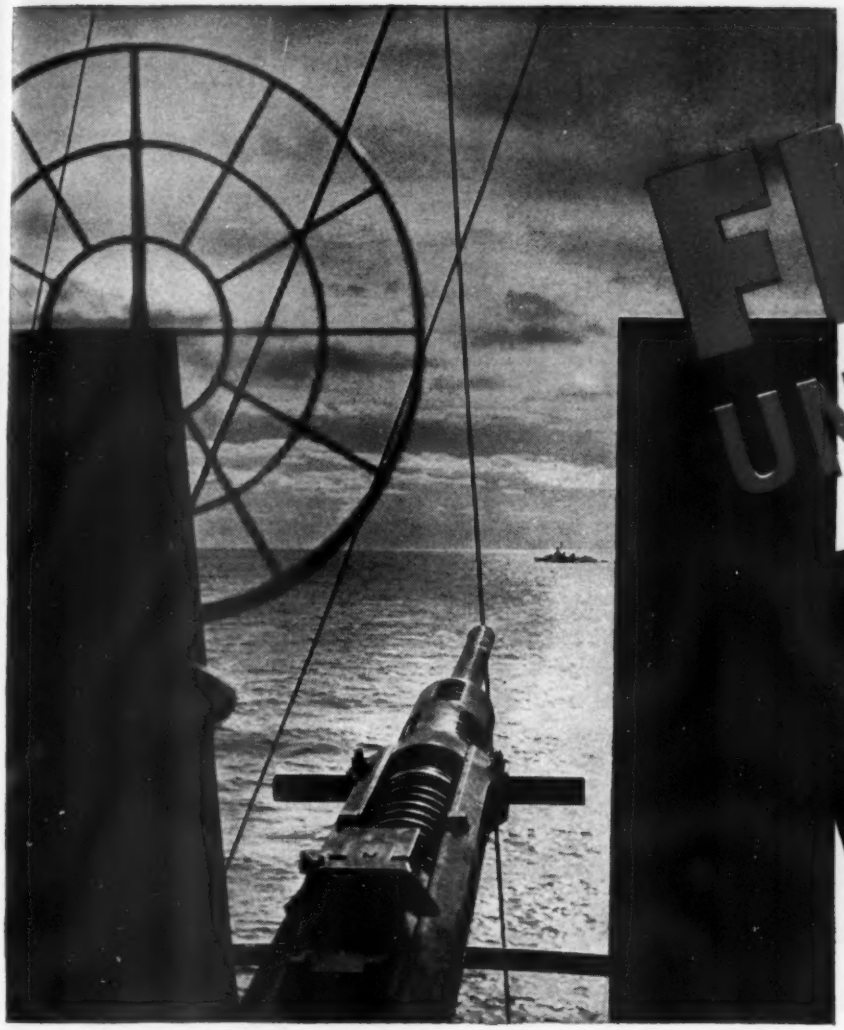
$1995

GOOD DELIVERY!

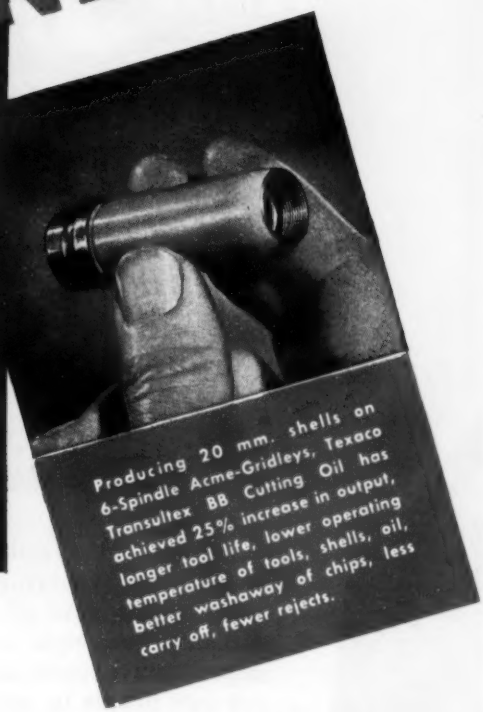
WRITE FOR DETAILED CIRCULAR

LEMPCO

5711 DUNHAM RD. BEDFORD, OHIO, U. S. A.



FLAK UNLIMITED



Producing 20 mm. shells on 6-Spindle Acme-Gridleys, Texaco Transultex BB Cutting Oil has achieved 25% increase in output, longer tool life, lower operating temperature of tools, shells, oil, better washaway of chips, less carry off, fewer rejects.

CAPABLE of firing 500 rounds a minute, this 20 mm. Oerlikon anti-aircraft gun and the ammunition to fire it are being produced in staggering quantities.

Chief contributor to America's modern miracle of mass production which is providing thousands of guns and billions of bullets is the use of present-day cutting coolants . . . foremost of which is TEXACO.

Texaco Cutting Oils permit higher speeds and feeds, assure increased output. They lubricate the tools, carry away heat, prevent chip welding, improve surface finish and tool life.

A Texaco Engineer specializing in cutting coolants is at your service through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ *More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.*

★ *More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.*

★ *More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.*

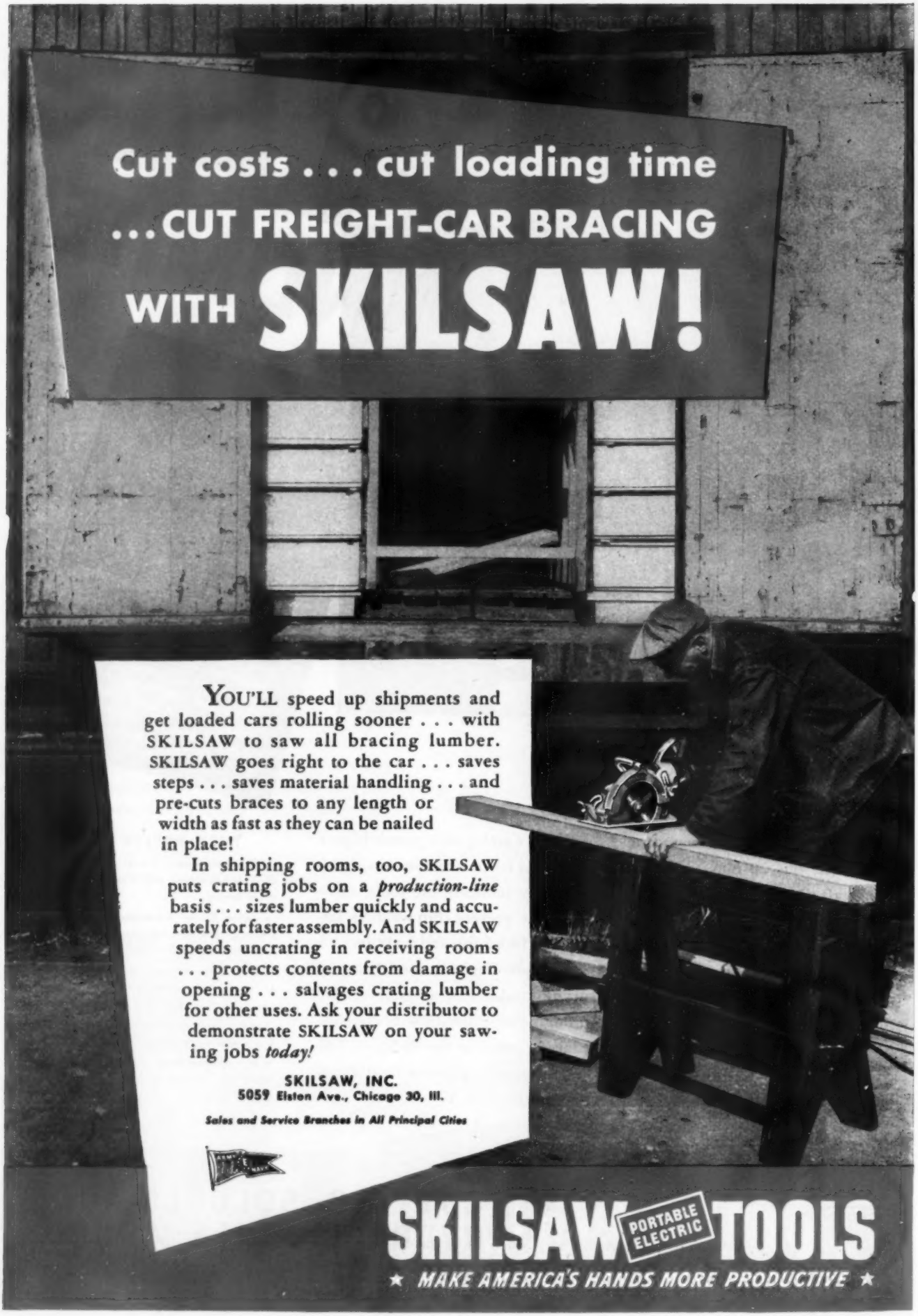
★ *More revenue airline miles in the U. S. are flown with Texaco than with any other brand.*

★ *More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.*

TEXACO

TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT — CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY



YOU'LL speed up shipments and get loaded cars rolling sooner . . . with SKILSAW to saw all bracing lumber. SKILSAW goes right to the car . . . saves steps . . . saves material handling . . . and pre-cuts braces to any length or width as fast as they can be nailed in place!

In shipping rooms, too, SKILSAW puts crating jobs on a *production-line* basis . . . sizes lumber quickly and accurately for faster assembly. And SKILSAW speeds uncrating in receiving rooms . . . protects contents from damage in opening . . . salvages crating lumber for other uses. Ask your distributor to demonstrate SKILSAW on your sawing jobs *today!*

SKILSAW, INC.
5059 Elston Ave., Chicago 30, Ill.

Sales and Service Branches in All Principal Cities

SKILSAW PORTABLE ELECTRIC TOOLS

★ *MAKE AMERICA'S HANDS MORE PRODUCTIVE* ★

better tool grinding-

FASTER
★
SAFER
★
CHEAPER

America's amazing ability to turn out tools of war in prodigious quantity is based upon cutting tools—sharp, precisely designed, skillfully ground, expertly used cutting tools.

The importance of frequent grinding—keeping cutting tools extremely sharp and effective—cannot be over-emphasized. Dull tools waste both time and materials and can cause expensive rejects. To avoid this pitfall select the right type of grinding wheel and use it frequently.

MID-WEST grinding wheels are eminently qualified for <u>any</u> duty in <u>any</u> grinding room. The MID-WEST "B" BOND wheel shown here, for example, is a fiber-backed cup wheel, carefully designed and precisely built for dry grinding carbide tools. Many of America's largest, most productive industrial organizations rely upon MID-WEST "B" BOND wheels to keep their cutting tools performing at peak efficiency. <u>You</u> can rely upon them, too.

MID-WEST ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasives

1960 E. MILWAUKEE AVENUE DETROIT 11, MICH.

Inclinable Press
Overhanging Single Action

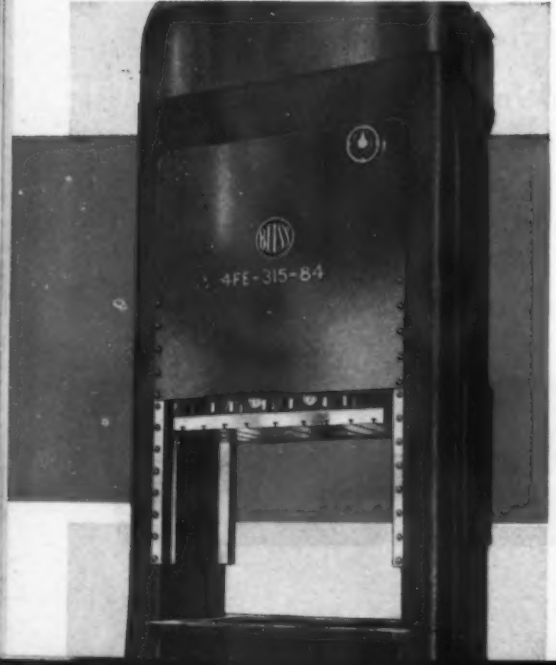
One Point Press
Overhanging Single Action

Two Point Press
Overhanging Single Action

modern design

The enclosure of working parts is for obvious reasons, a highly desirable feature in a machine tool. Its real value however is measured by the performance it is intended to protect and preserve. With this in mind Bliss engineers designed enclosed machines that combine smooth appearance, safety and longer life with the high quality performance inherent in the older open type.

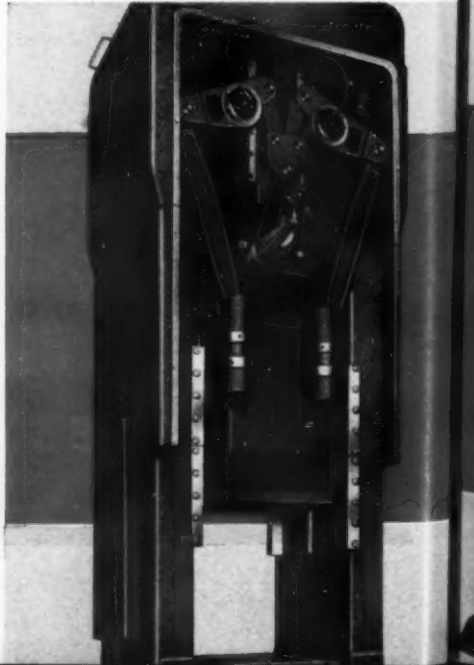
Bed areas, strokes and die space of the open models have been retained on the Enclosed Presses so that existing dies and tools can be used. A complete line of Enclosed Presses is available in all types illustrated.

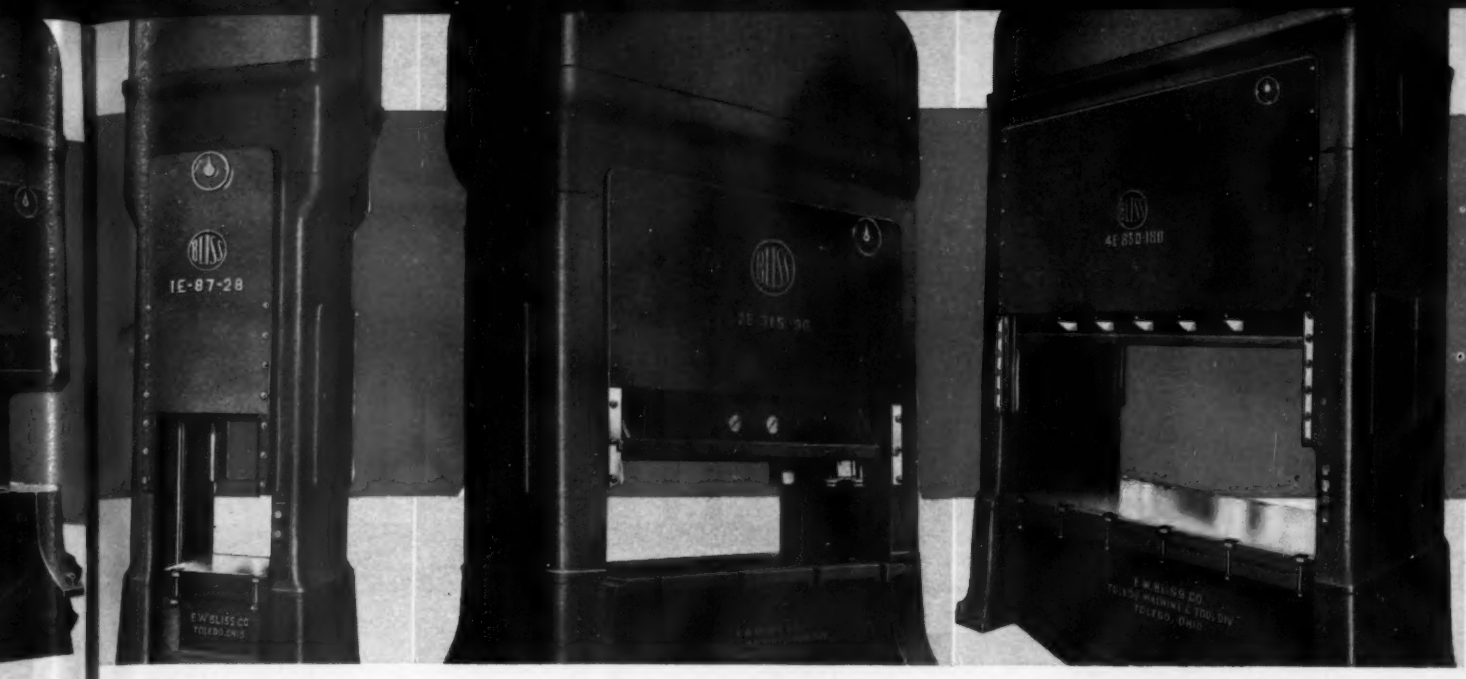


Four Point Eccentric Press
Straight Side Single Action

MARQUETTE · BLISS · TOLEDO · CONSOLIDATED
BLISS BUILT

One Point Press *(Covers off)*
Straight Side Double Action





One Point Press
Straight Side Single Action

Two Point Press
Straight Side Single Action

Four Point Press
Straight Side Single Action

smooth enclosures

ADVANTAGES OF ENCLOSED PRESSES

- *Unusually effective lubrication*
- *Reduction of torsional strain of the shaft*
- *Removal of exposed brackets*
- *Less floor space required*
- *Quiet smooth action*
- *All adjustments easily accessible*

Sales Offices:

BROOKLYN, N. Y. • TOLEDO, OHIO • CLEVELAND, OHIO • DETROIT, MICHIGAN • ROCHESTER, N. Y.
PHILADELPHIA, PA. • BOSTON, MASS. • NEW HAVEN, CONN.

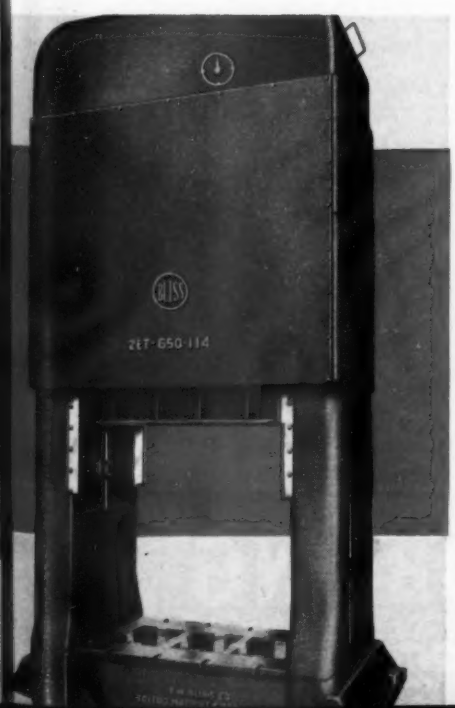
Plants:

BROOKLYN, N. Y. • TOLEDO, OHIO • HASTINGS, MICHIGAN • CLEVELAND, OHIO • SALEM, OHIO

E. W. BLISS COMPANY

53RD STREET AND 2ND AVENUE · BROOKLYN 32, NEW YORK

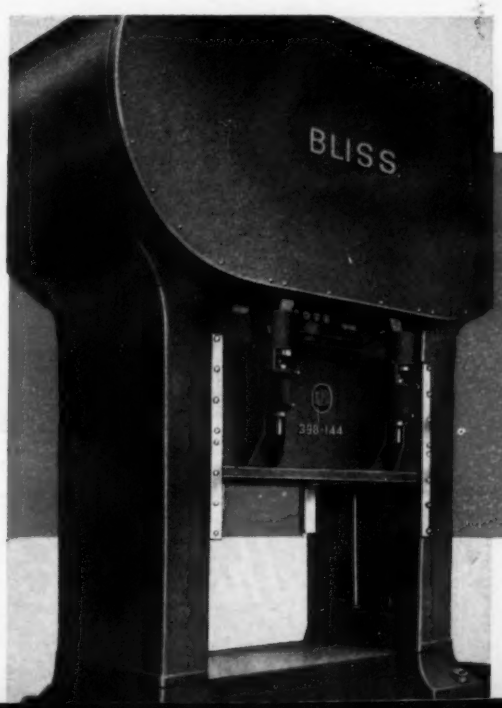
DEPT. 1



Two Point Press
Straight Side Double Action

MARQUETTE · BLISS · TOLEDO · CONSOLIDATED
BLISS BUILT

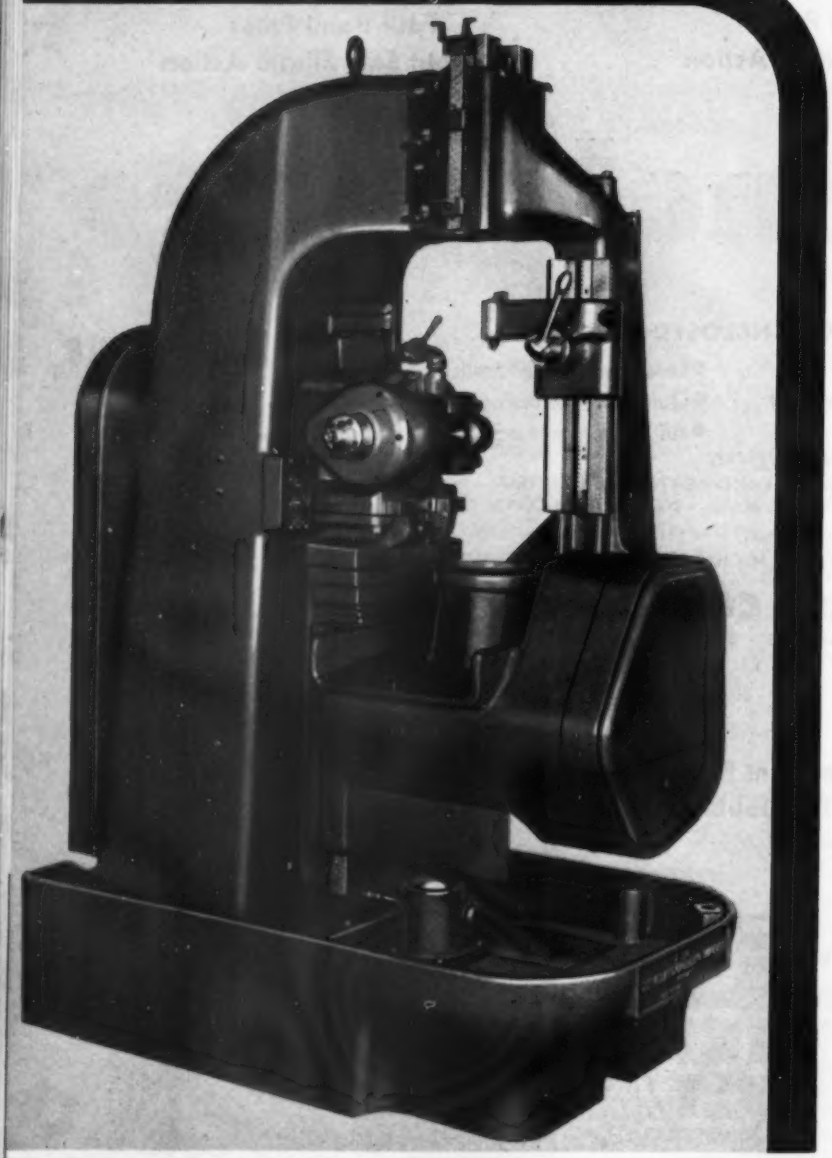
Four Point Press
Straight Side Triple Action



RIGIDITY AND EASE OF OPERATION

The RIGIDHOBBER

Bring your hobbing problems to C. H. engineers for specific information on your work or send sample or blueprint for estimate.



● Rigidhobbers are of vertical design incorporating a moving workhead and stationary workhead. This design, widely accepted as providing maximum rigidity, gives both units positive support during entire cutting operation.

TAILSTOCK BOTH SIMPLE AND UNIQUE

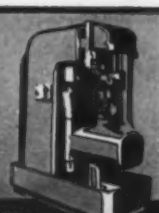
The tailstock incorporates a unique arrangement which locks and unlocks as well as moves the headstock. With one hand the tailstock can be moved out of the way and locked in a single motion. The draw bolt is operated from the front of the tailstock and is easily accessible and securely locks the tailstock adaptor in place. Thus presenting a particularly strong type of construction.

RESULTS IN ACCURATE PRODUCTION

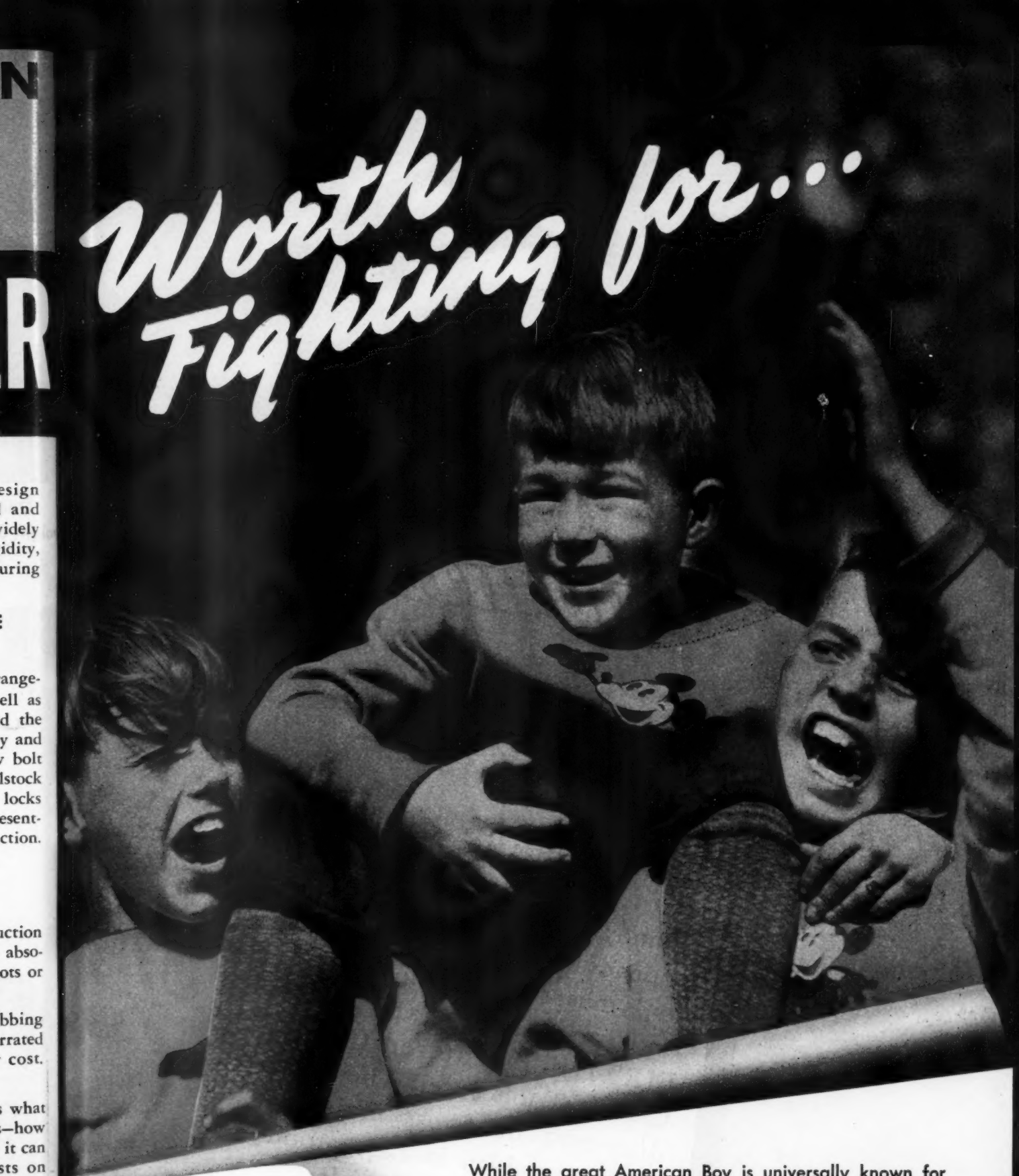
This rigidity of design and construction results in exceptional accuracy and absolute duplicity of work—either small lots or high production.

The Rigidhobber is adaptable to hobbing spur, and helical gears, spline and serrated shafts – quickly – accurately – at low cost.

Our bulletin tells what the Rigidhobber is—how it works—and how it can save time and costs on precision gear hobbing. Write for your copy now.



The CLEVELAND HOBBING
Cleveland ... MACHINE Company ... Ohio
BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS



Precision Built Milling Machines Since 1888

KEMPSMITH

KEMPSMITH MACHINE COMPANY • MILWAUKEE 14, WIS., U. S. A.

While the great American Boy is universally known for his undaunted courage and fighting spirit, his parents naturally prefer to have him fight on the gridiron, instead of on the battlefield. To afford such opportunity, however, the present devastating War must first be won. All of us should concentrate our energies in that direction . . . work diligently and willingly . . .

STAY ON THE JOB!

A-4223-1 PB-C

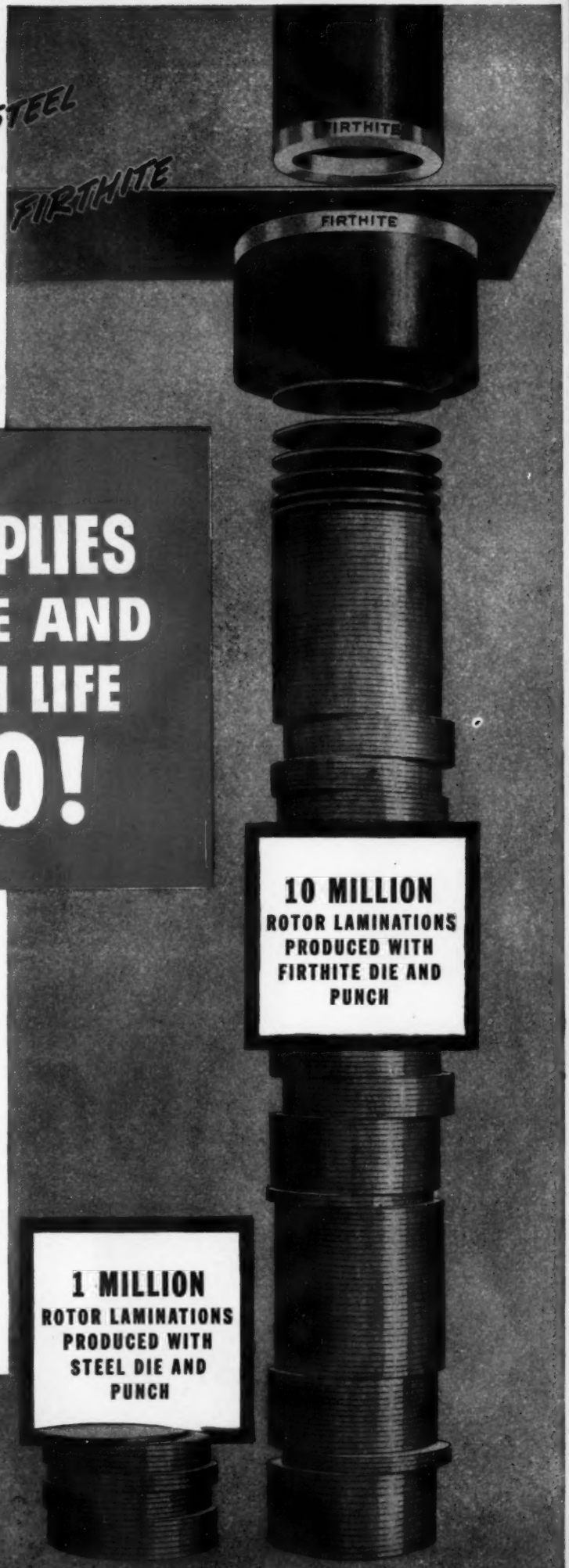
FIRTHITE
SINTERED CARBIDES
FOR UNIFORM PRECISION
WAR'S "appetite" for interchangeable parts knows no bounds. Since interchangeability depends upon **uniform precision,** tools must **stay** sharp on long runs or long cuts.—That's where FIRTHITE Sintered-Carbide Cutting Tools excel. Their near-diamond hardness maintains **uniform precision** in mass production and on hard materials.
ARMY NAVY
Firth-Sterling
STEEL COMPANY
Offices: McKEESPORT, PA. NEW YORK - HARTFORD - PHILADELPHIA
CLEVELAND - DAYTON - DETROIT - CHICAGO - LOS ANGELES

1,000,000 WITH STEEL
X 10
10,000,000 WITH FIRTHITE

MULTIPLIES DIE LIFE AND PUNCH LIFE BY 10!

FIRTHITE Lamination Dies have blanked, on one grinding, more pieces than an alloy tool-steel die punched in its entire "life." (On this operation a good steel die produces about a million pieces.) This Firthite Die has produced, with only a few honings, over ten million pieces and may be good for as many more.

Firthite Dies retain their original sharpness much longer than any steel dies. They cut clean and free—reduce burring, distortion, dimpling, and buckling. Firthite Dies also resist chipping or breaking, even in case of a miscut. They are superior for notching as well as blanking. A Firthite Engineer will gladly give you details.



Firth-Sterling
STEEL COMPANY

Offices: McKEESPORT, PA. NEW YORK - HARTFORD - PHILADELPHIA
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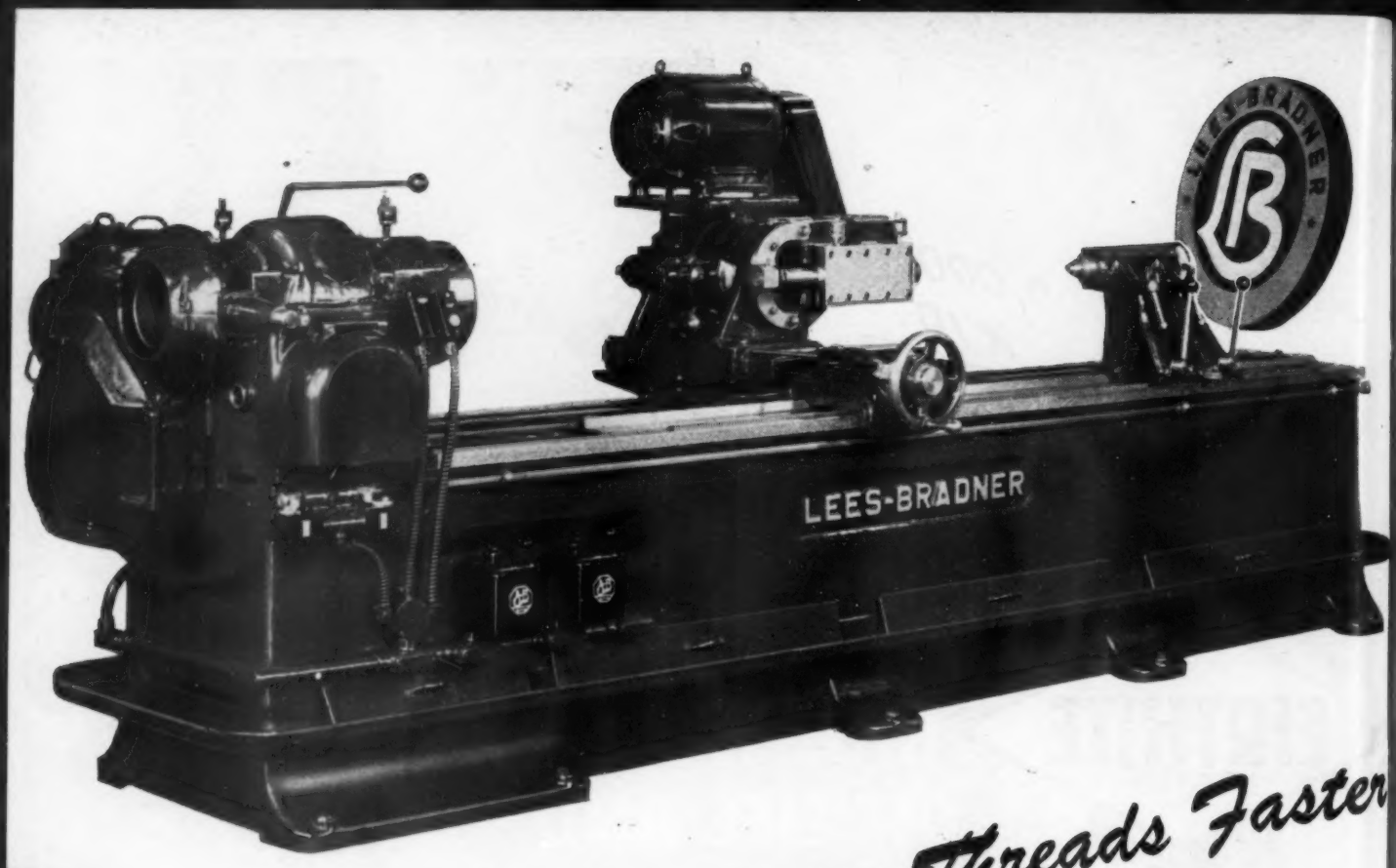


Generate Precision Threads Faster

● The inherent ruggedness of the Lees-Bradner Heavy Thread Miller permits feeds and speeds far in excess of ordinary practice. The result is a thread accurate in every detail—a finish incomparably better than former methods—with a marked increase in production.

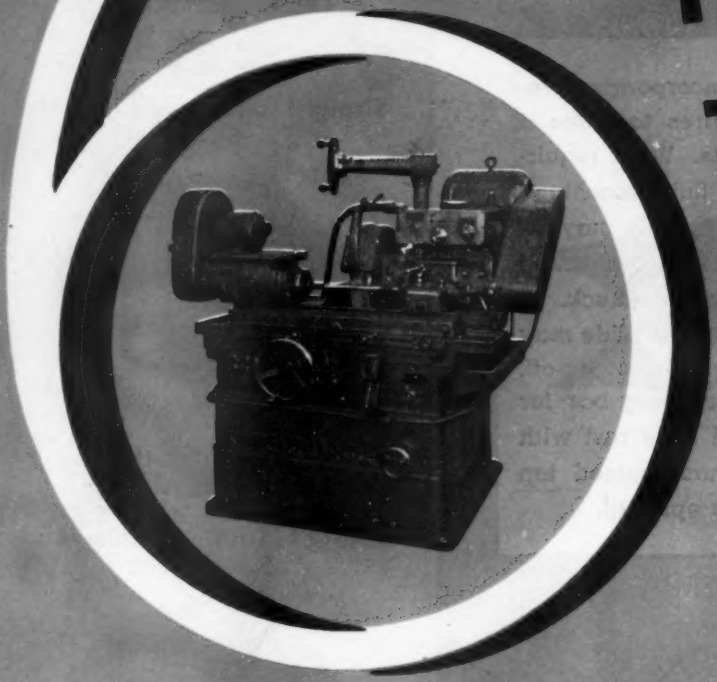
When schedules call for precision threads at high production—put it on the Lees-Bradner.

Why not investigate the advantages of applying this heavy duty tool to your precision threading requirements?

LEES-BRADNER
HT
THREAD
MILLER

The **LEES-BRADNER** *Company*

CLEVELAND 11 OHIO U.S.A.



FITCHBURG TYPE "B" GRINDER

New 6" Plain Cylindrical Automatic Precision Grinder

The Fitchburg Type "B" 6-inch automatic precision grinder features new engineering principles that result in more economical production of plain cylindrical parts. It is designed for greater accuracy and finer finish—with completely automatic cycles—rapid traverse to work, correct feed, grinding dwell and rapid return. In fact, it is equipped with every modern feature necessary to normal or wartime production.

So versatile is this grinder that its production adaptability permits both small lots of parts or continuous repetitive work to be handled with efficiency and economy. It is a grinder of entirely new design with all mechanisms readily accessible and ease of operation assured by centralized controls.

Write today for complete details and information about machines with 18" and 32" capacity.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Both Full Universal Grinders and Special Purpose Grinders

918 HAND SCREW MACHINE

For Bar or Individually Chucked Work Requiring up to Eight Successive Operations

The Rivett No. 918 Hand Screw Machine incorporates precision balanced design and operating features to make it an efficient producer on small duplicate parts. Work requiring up to eight successive [illegible] can be finish-machined at one chucking. Bar stock [illegible] spindle may be held in push-out collet, while [illegible] cked may be held in draw-in collet [illegible] huck. In combination with six turret [illegible] ons, [illegible] ide may be set up for straight or [illegible] ming, forming [illegible] g-off.

Other combinations [illegible] available using chasing bar for internal or external threading, or compound slide rest with turret tool post. Steel cabinet mounting has rimmed top and sump for cutting oil. Bench mounting is optional.

Straight and Taper Turning Slides

Straight Turning Slide and Fixed Block

Cutting-Off and Forming Blocks

SPECIFICATIONS

Swing over bed, dia.	9"
Distance between spindle mouth and face of turret	
With draw-in collet	14½"
With push-out collet	13½"
Collet capacity:	
Draw-in type, max. dia.	1"
Push-out type, max. dia.	1"
Step chuck capacity, max. dia.	6"
Jaw chuck capacity, max. dia.	6"
Spindle capacity, max. dia.	1⅛"
Travel of turret slide, max.	4½"
Number of tool holes in turret	6
Dia. and depth of tool holes	¾" x 1"
Swing over double tool slide	4½"
Cross travel of double tool slide	3"
Travel of straight turning slide	2¼"
Travel of taper turning slide	2¼"
Spindle speeds, eight forward and reverse:	
Low range	150 to 2500 r.p.m.
High range	225 to 3750 r.p.m.
Weight of hand screw machine, mounting and drive, net	900 lbs.

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

GUNS • TANKS • PLANES • SHIPS • SHELLS
VEHICLES ..... *whatever the need*

P&J EQUIPMENT

contributes to all out PRODUCTION

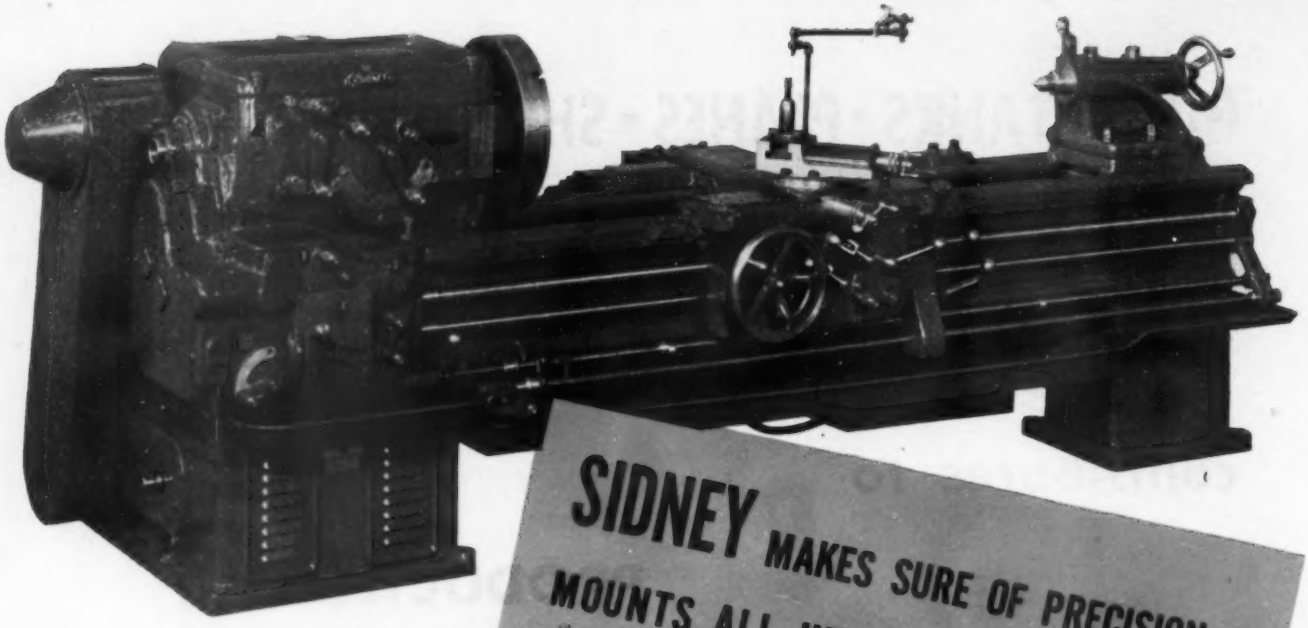
PHOTO BY U. S. ARMY AIR CORPS

P & J Automatic Chucking Equipment — on the production lines of plants turning out war weapons — are proving their mettle in speed, accuracy, convenience under "all-out" demands for quantity-quality performance. In many of these plants, the handicap of man-power shortage is being met through the ability of one attendant to easily handle two or more P & J machines. Even with women as operators, these easily operated machines are being depended on to keep duplicate parts production right up to schedule.

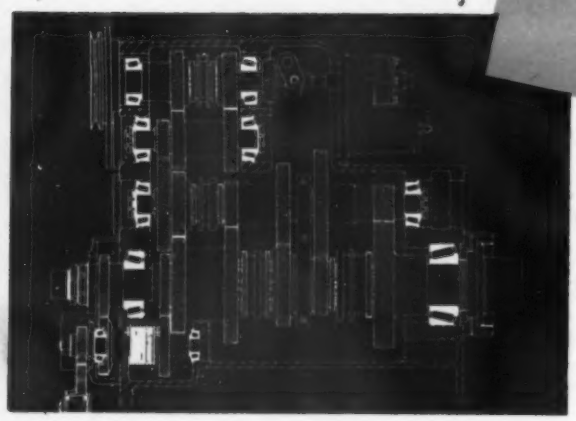
It is possible that a re-study of your tooling set-up by P & J engineers will disclose possibilities for a still further reduction in floor-to-floor time. Our technical staff is at your service to help you step up your production.

The* POTTER & JOHNSTON MACHINE CO., *Pawtucket, R. I.

BONDS BUY BULLETS...*buy more* BONDS



SIDNEY MAKES SURE OF PRECISION— MOUNTS ALL HEADSTOCK SHAFTS ON TIMKEN BEARINGS



The herringbone geared headstock of the Sidney 18″x10″ 16-speed engine lathe is a good example of precision design carried through to completeness by the use of Timken Tapered Roller Bearings on all shafts.

It means correct and constant alignment of every shaft and as a result, the assurance of accurate gear contacts from power input to spindle nose. The shafts also are fully protected against radial, thrust and combined loads; and gears have greater stability.

There is, furthermore, a definite saving of power through the elimination of friction at all bearing points and a radical reduction of maintenance through the prevention of shaft and bearing wear.

Mounting the spindle alone on Timken Bearings is an important factor of precision in any machine, but their full use as shown in the Sidney Machine Tool Company's design is very desirable. The Timken Roller Bearing Company, Canton, Ohio.

Post-war competition won't worry those who prepare for it now. Redesign your equipment to use more Timken Bearings.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

THE CINCINNATI PLANER CO.

Thanks The Netherlands for giving us Joe

One of our service men, Joe Baltus, was born in Vaals, Limburg, Holland, in 1905, and remembers wearing wooden shoes and seeing the tulips, and doing all the things that little Dutch boys did before the Germans came. He sailed boats, played in the sand and helped paint the windmills before coming to America while not yet twenty.

Joe couldn't speak a word of English when he landed, but he quickly learned the language and in 1929 was able to obtain a job painting castings.

He studied at night and carefully gathered knowledge of Cincinnati Planers, Vertical Boring Mills, and Planer Type Milling Machines. He told the superintendent that he thought he could be more useful as a machine operator. After operating several machine tools, he became an assembler, and later worked on the erection floor.

Joe did his work so well that now he is sent out to install Hypro machines in all parts of the U. S. A. This is the best country in the world and nobody is any more proud of the American Flag than our Joe.

Joe was happily married in 1929 and has three children. He is a proud owner of a large farm and is happy to live in a country which provides more freedom and opportunities.

We tell this story of Joe to let you know the kind of men whose lives go into the production of Cincinnati Hypro Machine Tools. He is one of the many working faithfully to rid this world of ugly wars. Cincinnati Hypro Planers, Vertical Boring Mills, and Planer Type Milling Machines are as fine as the men who build them.

THE CINCINNATI PLANER COMPANY

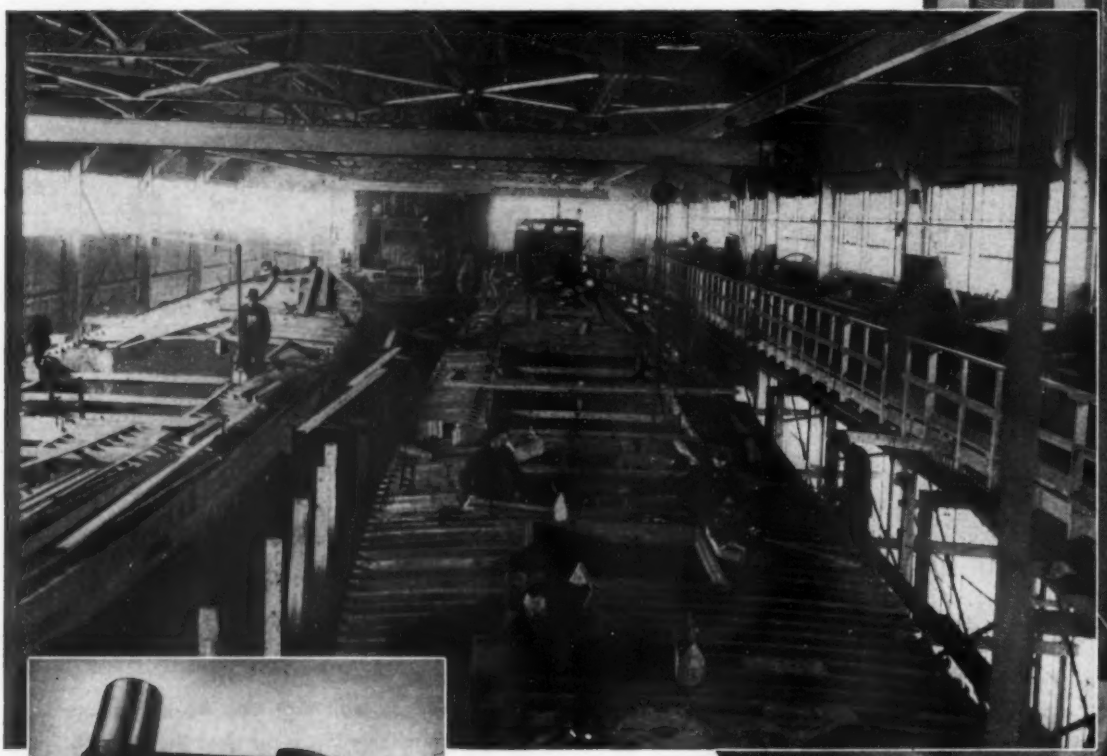
Planers...Vertical Boring Mills...Planer Type Millers

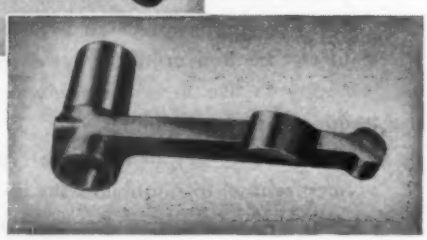
CINCINNATI . OHIO . U.S.A.

LINES BEHIND THE LINES

CONVERTED FROM PLEASURE CRAFT TO P-T's AND S-C's, THE BOATING INDUSTRY BUILDS AT TOP SPEED FOR VICTORY!

Keeping pace with the Kaisers and other miracle workers in the shipyards, the small boat builders are placing the emphasis decidedly on speed. Yet the highly efficient machinery in the boats they are building also puts a premium on accurate parts fitting. To secure this production-with-precision the boating industry relies heavily on broaching. Broaching—a better way to do many metal working jobs — is the only *right* way to do some!





Using an American Type T Three-Way Broaching Machine, top and bottom faces are finished on the rocker arm shown in before and after views above. Many marine products — including parts for motors, transmissions, armament, and electrical systems—are broached economically with American equipment. American's *complete* broaching service — machines, tools, and engineering — makes war production more efficient, post-war production more profitable.

BROACHING IS BETTER THE *American* WAY

American

BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO.

CYLINDRICAL PLUG AND RING GAGES

METRO PLUG AND RING GAGES ARE MANUFACTURED IN ACCORDANCE WITH AGD STANDARDS

•

4 Kinds

NEW CHROME New gages finished with LONG LIFE Hard chrome plating.

NEW STEEL New gages of Hardened steel.

SALVAGE . . . Worn gages refinished with LONG LIFE Hard chrome plating.

CARBIDE New gages with EXTRA LONG gaging life.

ALL GAGES PRECISION LAPPED

SPECIAL GAGES TO ORDER

Catalog No. 101

gives complete details on all METRO TOOLS and GAGES. Get your copy now.

METRO TOOL AND GAGE CO

4240 PETERSON AVE.
CHICAGO, 30, ILL.

Hail to the BLACK GANG

... The guys that keep 'em goin' !

GENERAL MACHINERY CORPORATION

GENERAL MACHINERY CORPORATION

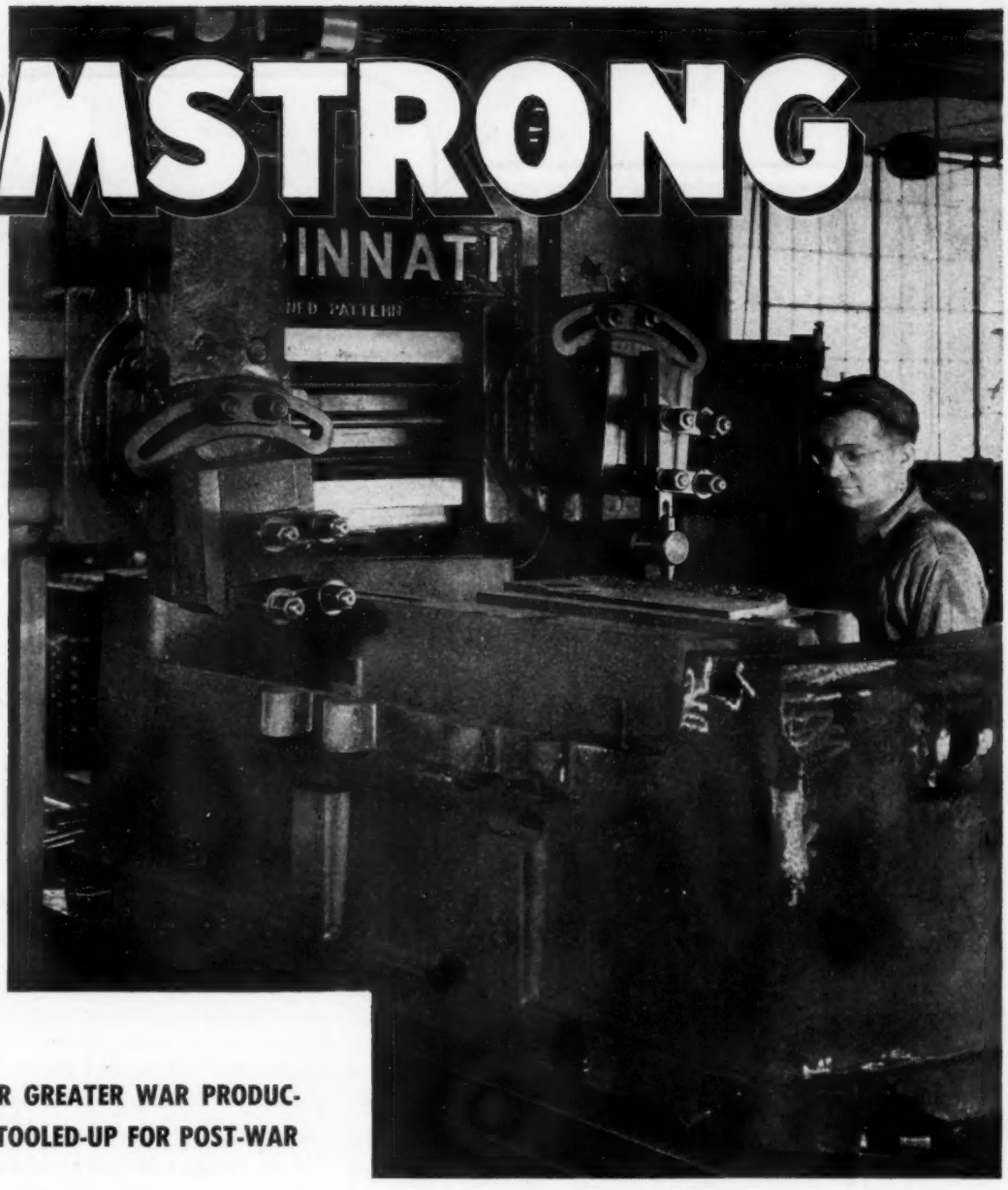
HAMILTON, OHIO

THE NILES TOOL WORKS CO.

THE HOOVEN, OWENS, RENTSCHLER CO.

GENERAL MACHINERY ORDNANCE CORPORATION

ARMSTRONG



TOOL-UP NOW FOR GREATER WAR PRODUCTION . . . AND BE TOOLED-UP FOR POST-WAR COMPETITION.

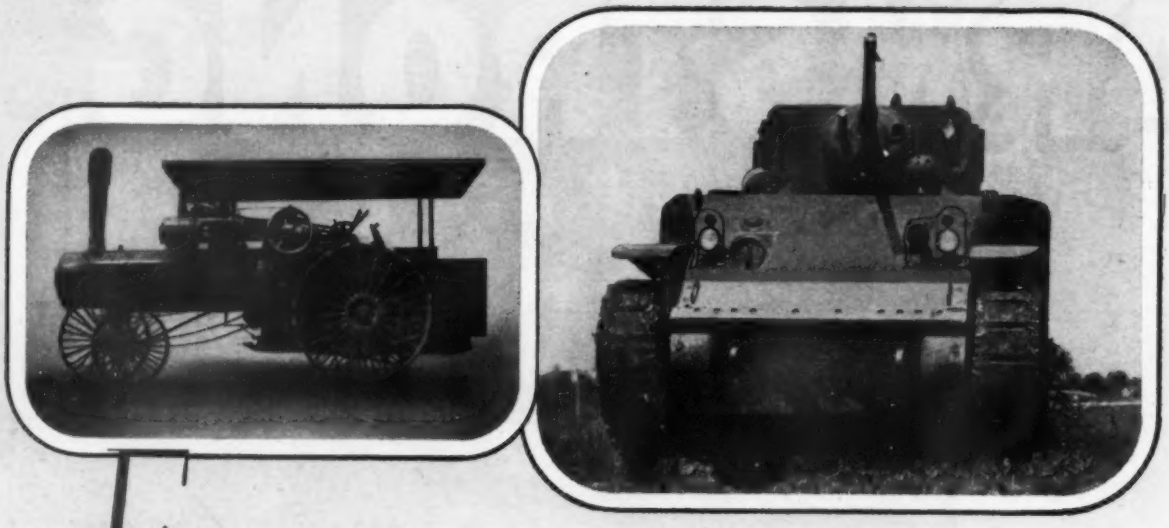
Equip every lathe, planer, slotter and shaper with a complete set of ARMSTRONG TOOL HOLDERS — with the correct types and sizes for every operation. While the extra strength and ready adaptability of ARMSTRONG TOOL HOLDERS make it possible to "get by" with a minimum of types and sizes, the correct ARMSTRONG TOOL HOLDERS will permit greatly increased production on each operation — will permit speed and feeds often double so-called "Standard" speeds and feeds, without loss of cutting efficiency.

Tool-up completely now with ARMSTRONG TOOL HOLDERS to increase your War Production and you will also be tooled-up for post-war competition, because each ARMSTRONG TOOL HOLDER is a permanent, multi-purpose tool that will not only outlast the war, but with the change of a cutter, will be ready to start on post-war production.

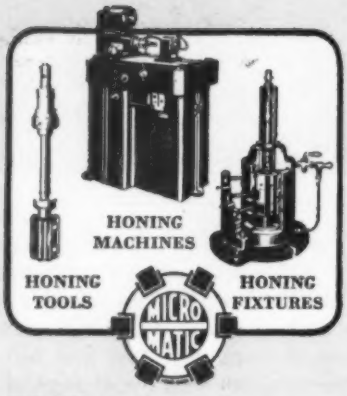
ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
315 N. FRANCISCO AVE. CHICAGO, U. S. A.

Eastern Warehouse & Sales Office:
199 Lafayette St., New York

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms



From plowshares to SWORDS ...TO PLOWSHARES



Micromatic

HONE CORPORATION

Detroit, Michigan

Yesterday—*The steam "traction engine" gave way to the gas powered crawler tractor just in time to suggest the World War I tank. It was only a crude, slow moving offensive weapon, but it promised tremendous tactical advantage. Only the use of early abrading processes made it possible.*

Today—That swift powerful engine of destruction—the modern tank—is the product of many years of combined experience in ordnance and automotive practice. Honing, the advanced abrading process, is of utmost importance in making possible this modern beating of "plowshares" into "swords".

Tomorrow—Our "swords" must again become "plowshares"—war developments always produce technological advances usable in peace. What these advances may be, we can only guess. But the fundamental process of Microhoning will be ready with new refinements to meet these needs.

This process which generates bore accuracy for roundness and straightness within .0002" to .0003"—which removes up to 65 cubic inches of stock per hour, has been developed into many ramifications, now being used for war machines. Tomorrow they will be available to speed peacetime production.

MAKERS OF • HONING MACHINE TOOLS

How to Make a Sprinter out of a PILLBOX

Tons of metal—guns and ammunition—fuel—charging over a blasted landscape at 45 miles per hour—the "pill box" has become a sprinter in the modern tank.

Performance of this effective war machine depends on the modern engine power plant—the way it is designed and made. This engine must have amazing stability, durability—highest all around performance qualities. Yet it must lend itself to fastest maintenance or repair with minimum equipment.

Microhoning contributes largely to this result because it offers the most modern method of final precision stock removal and close control of surface character.

It provides a high degree of accuracy and any desired surface finish—*without* injurious frictional heat—*without* deformation of subsurface metal structure.

Without this close precision and controlled finish, modern tactical use of the tank would be impossible.

Some Microhoned Tank Bores

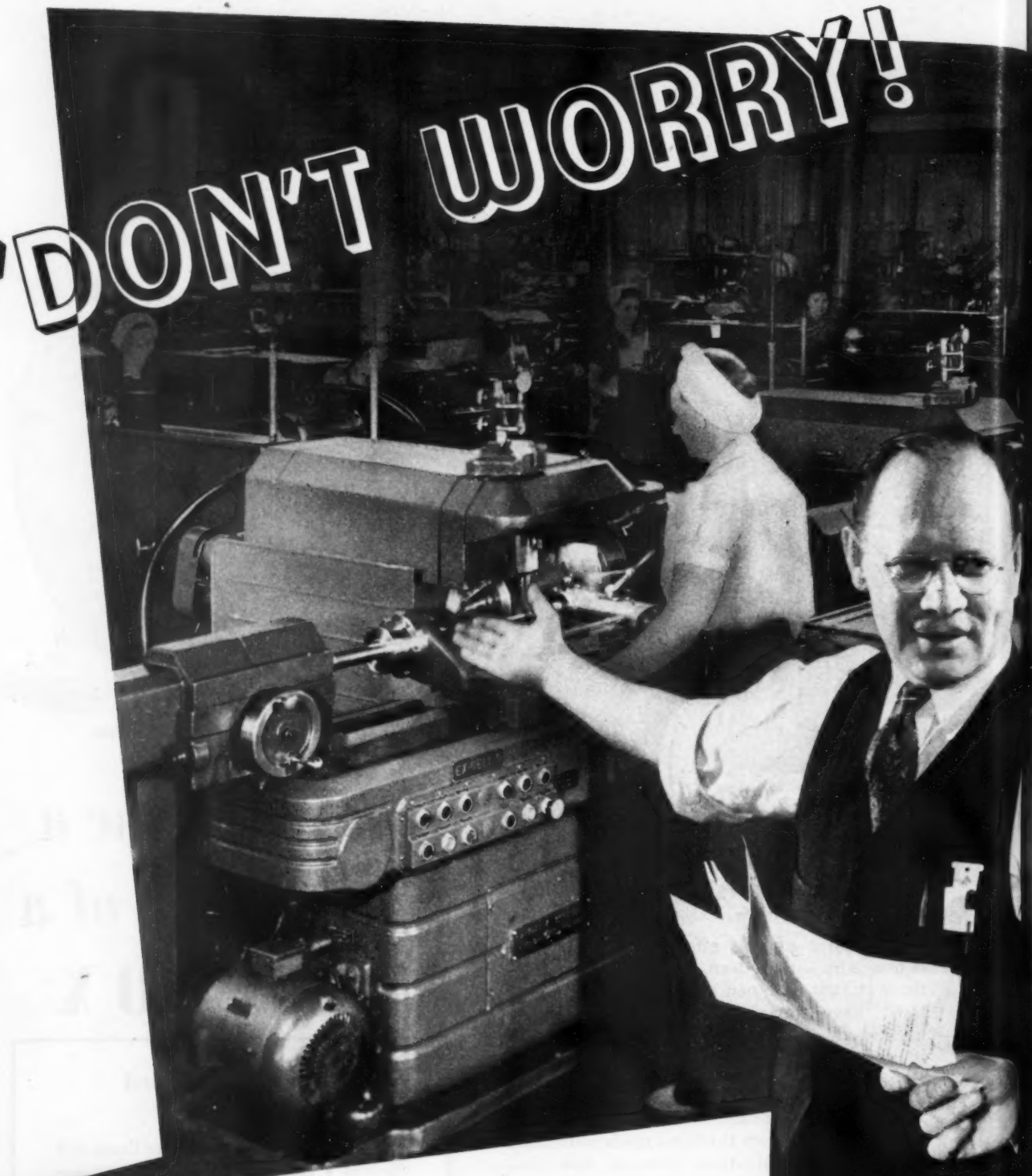
Gas and Diesel Engine Cylinder Bores and Sleeves • Connecting Rod Bores (Large End) • Valve Guide Bores • Diesel Fuel Injector Bores • Transmission Gear Bores • Gun Recoil Cylinders • Gun Predictor Hydraulic Cylinders • And Many Other Parts

MICRO MATIC

MICROMATIC HONE CORPORATION

DETROIT, MICHIGAN

"DON'T WORRY!



To left: Ex-Cell-O book on Thread Systems, Forms, and Measurements that contains much practical information for all those using Precision Thread Grinding Machines. A request for a free copy of this new book, on your business letterhead, will be given immediate attention.

PRECISION THREAD GRINDING, BORING AND LAPPIN ACHI
GRINDING SPINDLES · BROACHES · CONTINENTAL CUTTIN OLS
EQUIPMENT · PURE-PAK CONTAINER MACHINE AILR

★

We can get that extreme accuracy and output on these EX-CELL-O Thread Grinders"

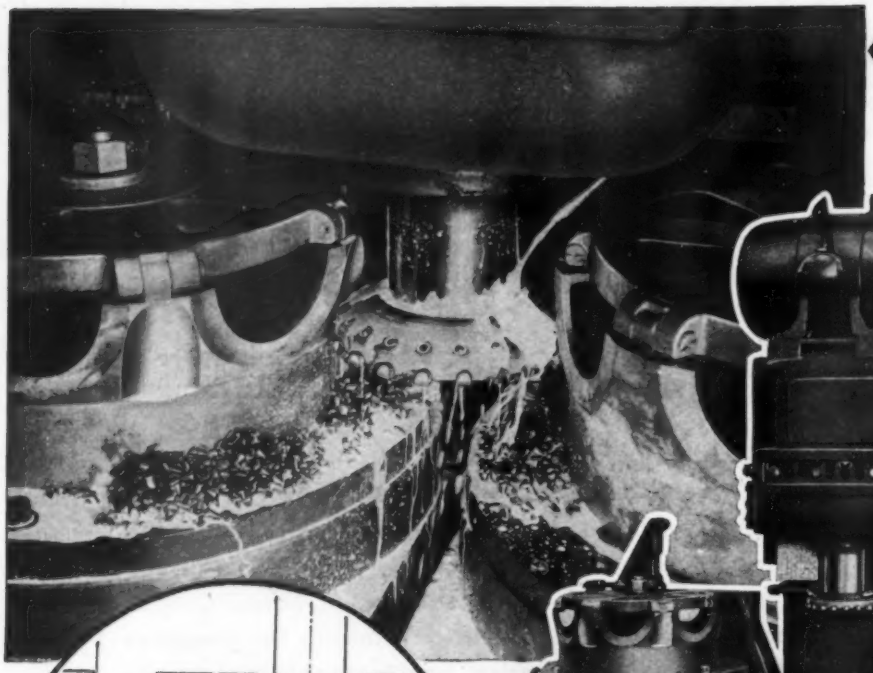
• *Yes,* where hardened threaded work has to be accurate, and produced fast, *precision thread grinding* is the right answer. No other production threading method compares with grinding after hardening for accuracy of form, size, lead, and uniformity of finish; often the precision grinding of threads also means increased output and reduced unit cost. Ex-Cell-O, pioneer in developing the precision thread grinding process in America, has available a complete line of standard precision thread grinders—making it possible for you to select the exact type of machine required to handle your precision threaded work successfully on a profitable production basis. Write to Ex-Cell-O today for copy of new General Products catalog (Bulletin No. 27121). It contains illustrations and specifications of Ex-Cell-O precision thread grinders and information on other Ex-Cell-O precision-made products.

EX-CELL-O CORPORATION • DETROIT

Ex-Cell-O Style 39-A Precision Thread Grinder—for grinding internal threads.

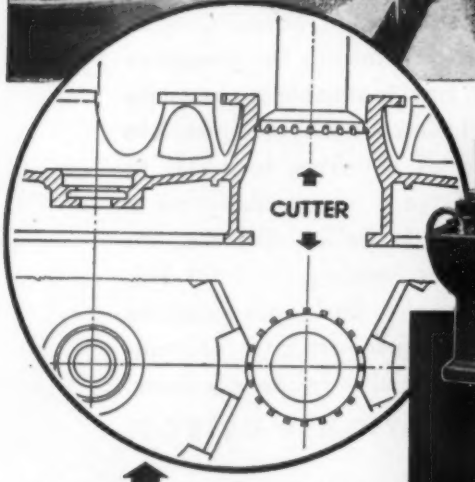
PPIN ACHINES · TOOL GRINDERS · HYDRAULIC POWER UNITS
UTTIN OLS · DRILL JIG BUSHINGS · DIESEL FUEL INJECTION
HINE AILROAD PINS AND BUSHINGS · PRECISION PARTS

XLO
EX-CELL-O *for* PRECISION



Two pieces of work are finished at the same time by using both sides of the cutter—a typical Cross development for conserving manpower, floor space, equipment and capital funds.

Cross developed and built this special machine to automatically mill crankcases for aircraft engines and thereby eliminate scrap, improve quality, increase production, reduce floor space and cost.



The downward feed of the cutter is synchronized with the inward feed of the work to produce a formed contour.

CONSERVE MAN POWER

WITH *Special Machinery*

Alert manufacturers are using more and more special machinery to maintain or increase production volume with a reduced labor force which often lacks skill or previous mechanical experience. Modern special machinery is accurate and automatic so the operator is only required to clamp the part and press an electric button—the machine does the work and to prescribed tolerances without further attention. Cross analyzes manufacturing problems, develops and builds special machinery to do better work and to do it faster with less labor.

Operating mechanisms are all built into the machine as integral self-contained units—well protected from pilfering and dirt.

★ ★ MACHINE CROSS TOOLS ★ ★

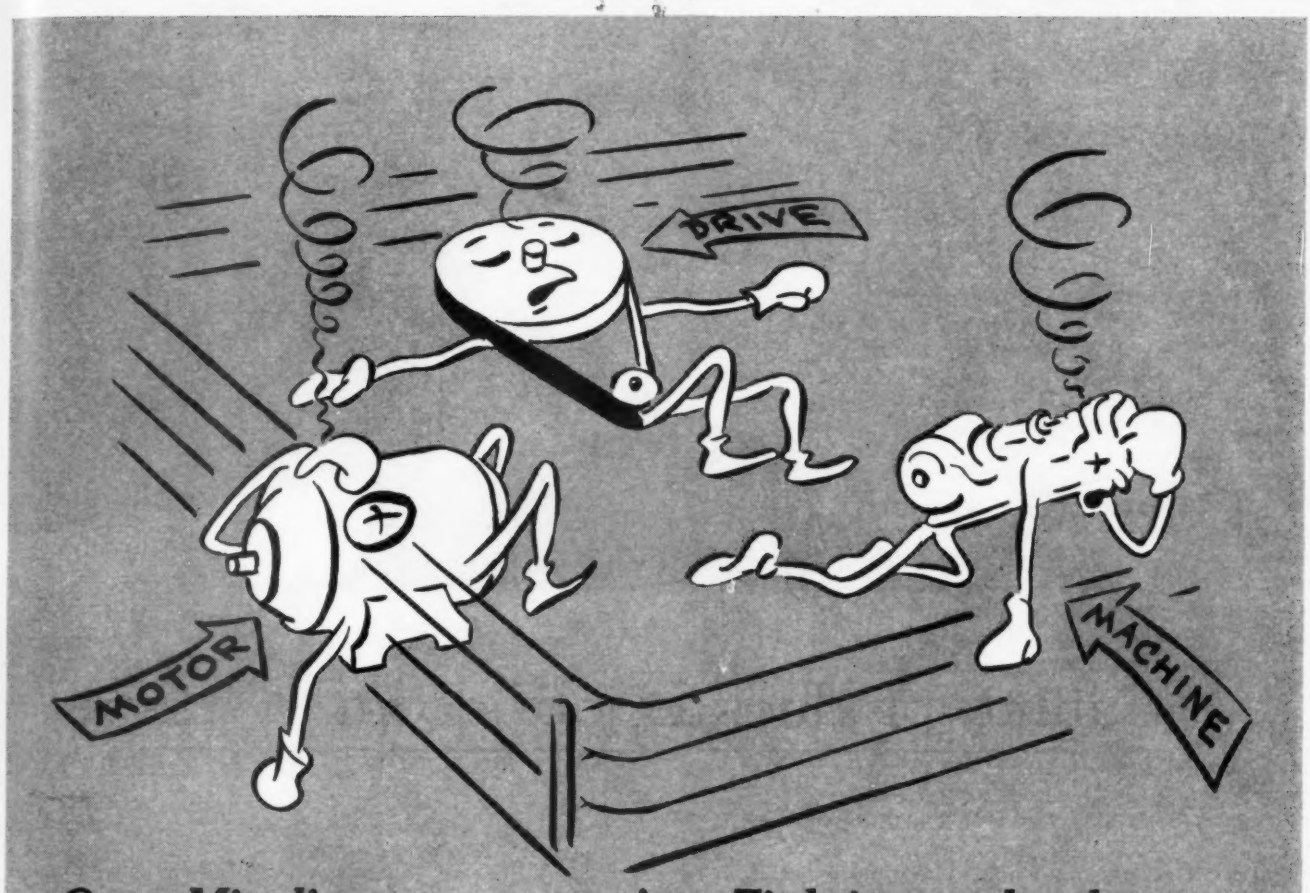
CROSS GEAR & MACHINE CO. ★

Established in 1898

DETROIT, MICHIGAN, U.S.A.

S-6

STOP THIS FIGHT!



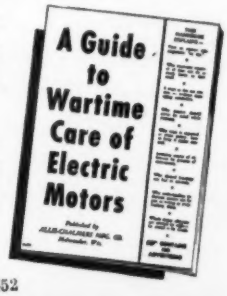
Once Misalignment starts 'em Fighting each other . . . the only Question is: Which will go First?

SPRUNG OR BROKEN shafts, burned-out bearings, overload failure—are cases of motor damage commonly caused by Misalignment. And the damage can occur in drive or driven machine, too. For when these elements are assembled in incorrect geometry, bending, breaking or excessive wear must result. *Something has to "give!"*

Picture above is from Allis-Chalmers' new "Guide to Wartime Care of Electric Motors" . . . which takes a fresh look at Misalignment *and the 8 other main enemies of motor life!*

Over 100,000 copies of this valuable new book are already in use by armed forces and industry. Applies to all makes—contains no advertising. Send for *your* free copy.

ALLIS-CHALMERS, MILWAUKEE 1, WIS.



A-1652

ALLIS-CHALMERS MOTORS

When you do need new motors, look into the strength, solidity and all-around protection of the new "Safety Circle"—protected top, sides, ends and bottom.

AC WE WORK FOR VICTORY WE PLAN FOR PEACE

Cutting production jobs down to size

You don't give a man a job today, and expect him to grow to meet it; you give the job a man, and whittle it down to his size.

W·A·B Controls on production machines and equipment help, by compensating for lack of physical strength, seasoned judgment, and long experience in new operators.

A whole cycle of operations can be governed by a few inches of travel of the small control handle. Safety features are inherent in the design. The operator can't set up two opposing actions, and so wreck the machine; the controls won't let him.

The operating mechanism can be designed to generate any desired force, according to the needs of the job. Fatigue is greatly lessened.

In graduating controls, precise agreement between the handle and the operating mechanism is obtained. This precision is not affected by time or wear.

You are probably giving a lot of thought—right now—to the improvement of products and production methods, to meet post war needs and post war competition. If a control problem is involved, the chances are excellent that W·A·B systems can help you. You'll find it profitable to include them in your planning.

Westinghouse Air Brake Company

INDUSTRIAL DIVISION

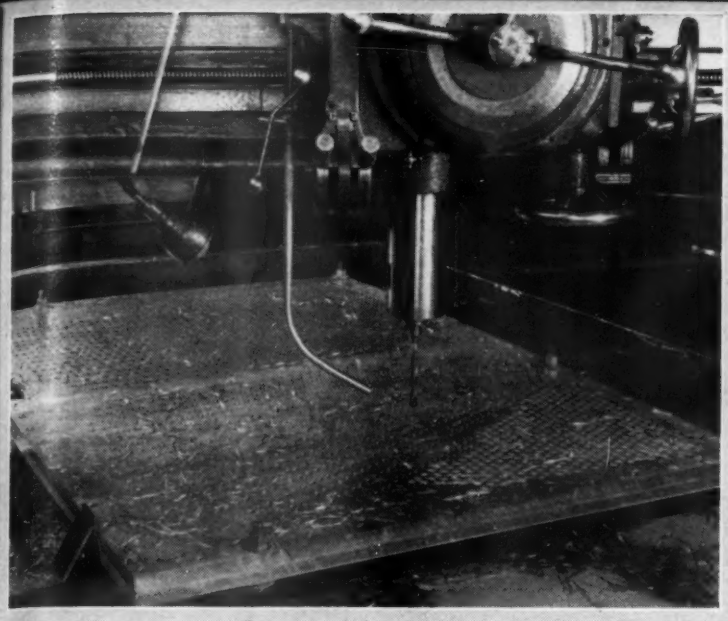
General Offices: Wilmerding, Pa.

74 Years of Pneumatic Control Experience

W·A·B

Pneumatic • Pneumatic-Electric • Pneumatic-Hydraulic

control systems



FOSDICK RADIAL

enables women operators to replace manpower needed for our armed forces.

• The hydraulic column clamp — arm clamp — safety nut — and variable rapid traverse — the centralization of controls in the head — the safety spindle are a few of the outstanding features of Fosdick Radials that make for ease of operation — accuracy and rigidity. They are points of construction that enable women to become expert operators in a short time.

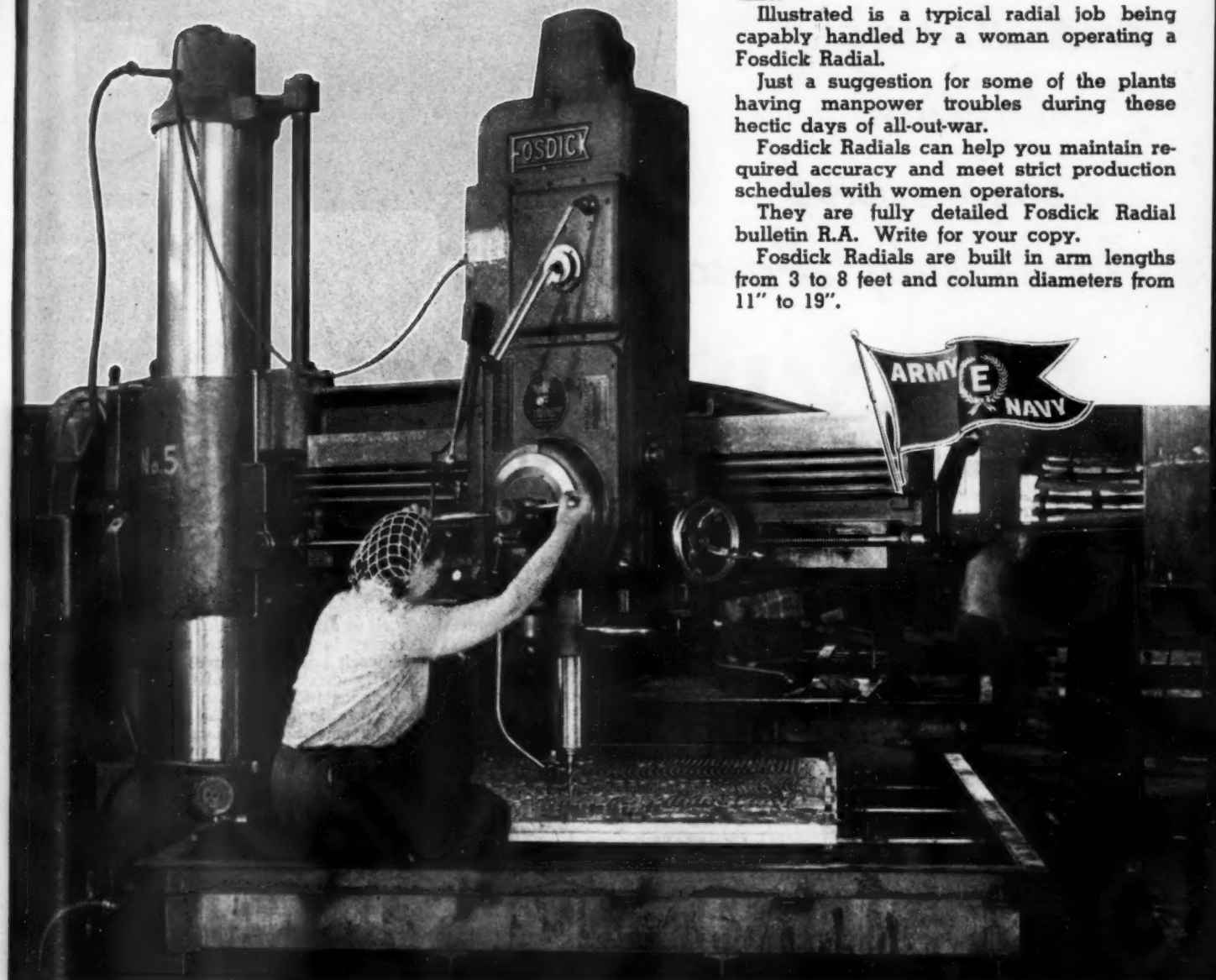
Illustrated is a typical radial job being capably handled by a woman operating a Fosdick Radial.

Just a suggestion for some of the plants having manpower troubles during these hectic days of all-out-war.

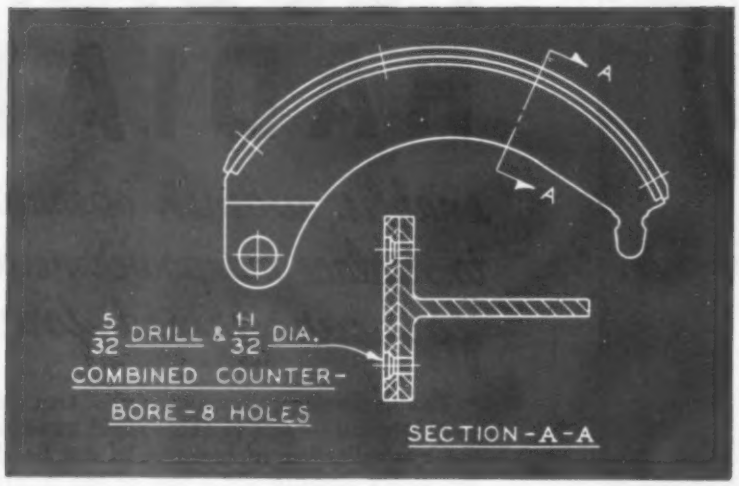
Fosdick Radials can help you maintain required accuracy and meet strict production schedules with women operators.

They are fully detailed Fosdick Radial bulletin R.A. Write for your copy.

Fosdick Radials are built in arm lengths from 3 to 8 feet and column diameters from 11" to 19".



FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, ... OHIO

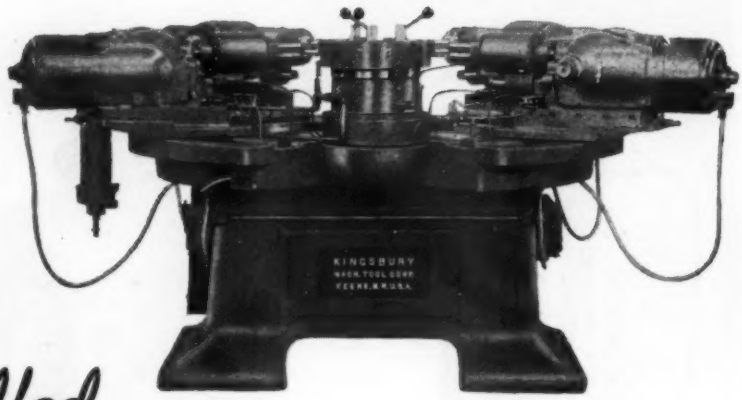


THIS IS A

FLEXIMATIC

AUTOMOTIVE JOB!

Brake Shoe and Lining Production Speedily and Accurately Handled



FLEXIMATIC

by KINGSBURY

One important advantage of the FLEXIMATIC is the fact that it is a machine providing automatic indexing for performing various machining operations in a single chucking of the work.

This method is specifically applied to the Model GD Eight-Spindle Fleximatic arranged for drilling and counterboring brake shoes and linings shown in the accompanying drawing. Many variations of the machine are available, some for lining only and others for shoes only.

The FLEXIMATIC system pioneered by Kingsbury, involves a single base on which is mounted an indexing turret and standard metal cutting units for each operation such as drilling, reaming, counterboring, etc. The turret is designed to receive a number of duplicate work holding fixtures and can be rotated intermittently under control of the operator for presenting fixtures to loading and working stations. While units are in action, the turret is locked securely. All automatic operations are performed simultaneously while the operator removes a finished part and replaces it with a rough part at the loading station.

Speed, accuracy and easy handling even by unskilled operators are inherent in the performance of FLEXIMATICS.

Write today for illustrated Bulletin showing a number of different set-ups

KINGSBURY MACHINE TOOL CORPORATION

KEENE, NEW HAMPSHIRE, U.S.A.

. . . NO MORE MANUAL GEAR-SHIFTING!

POWER-OPERATED SPEED SELECTOR PROVIDES AUTOMATIC SPEED CHANGING

Here's the lively change of pace that simplifies machining operations—speeds up turret lathe production.

You simply set the dial. The Gisholt Speed Selector responds with any one of twelve spindle speeds—makes the shift automatically by hydraulic power. Selecting the proper cutting speed is quick and easy for each operation in turning, drilling, boring, reaming, threading, etc. No time-wasting calculations; no complicated adjustments. The Speed Selector makes more expert operators—keeps machines producing at maximum efficiency with minimum effort.

Available for all standard Gisholt Turret Lathes, the Speed Selector is stepping up production in hundreds of vital war plants.

THE GISHOLT SPEED SELECTOR provides extreme flexibility to handle a wide variety of work. It may be used in two ways, as follows:

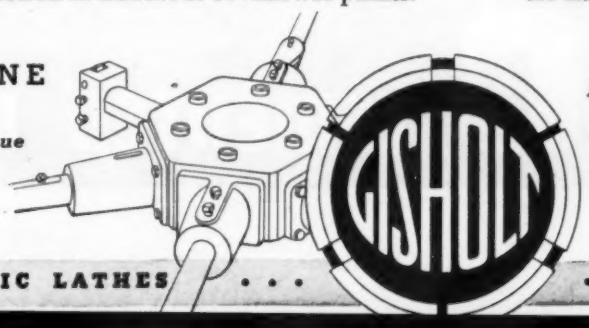
DIRECT—By simply turning the control wheel, the operator may obtain any desired spindle speed without intermediate stops.

PRE-SET—Speed is selected in advance of actual change. When operator finishes cut, he merely presses a trip; speed change is automatic.

In either case, when dial is set for any of the six high speeds, a touch to the trip produces a corresponding low speed for threading or reaming.

All spindle speed changes may be made without stopping the spindle or releasing the main drive clutch.

GISHOLT MACHINE COMPANY
1201 East Washington Avenue
Madison, Wisconsin



Look Ahead . . . Keep Ahead . . .
with Gisholt Improvements
in Metal Turning

ET LATHES • AUTOMATIC LATHES . . . • BALANCING MACHINES

● You can't fool a micrometer! Your "mike" will prove the longer cutting life of TECO Cemented Carbide because you hold accurate tolerances for longer runs—produce more pieces between grinds.

Rigidly controlled in manufacture, TECO Cemented Carbide is harder, denser, more uniform in structure—therefore more resistant to wear and breakage in high-speed turning, boring and facing of the toughest metals.

Increase your output per machine with TECO Cemented Carbide. Available in tools and blanks, in grades, styles and sizes for practically every machining need. Write for detailed catalog.

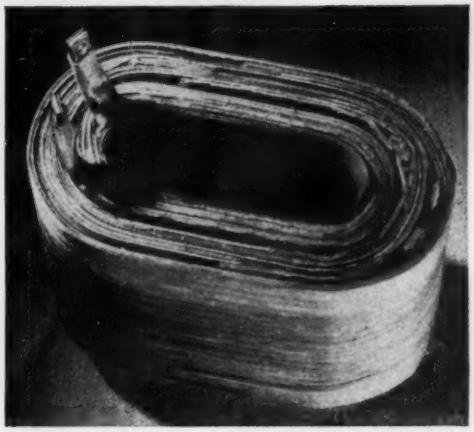
ARMY E NAVY

TUNGSTEN ELECTRIC CORPORATION 568 39th Street, Union City, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects & Builders Bldg., Indianapolis, Ind.

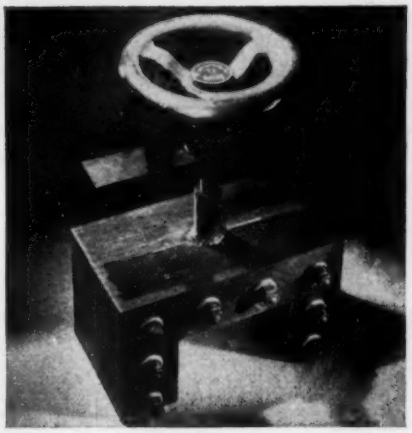
TECO *Pioneers in Tungsten Carbides for over a Quarter Century* TELO **CEMENTED CARBIDE**

HERE'S THE NEW AMPAC '400' TO SAVE YOU MONEY!

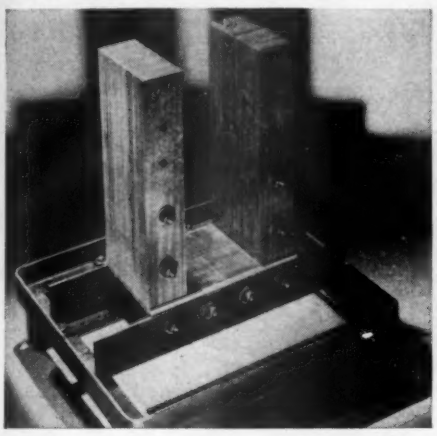
1 It's an *a-c* welder — with no arc blow! Capacity is 50 to 500 amps — *the* ideal size. Note how simple, rugged the new Ampac is...



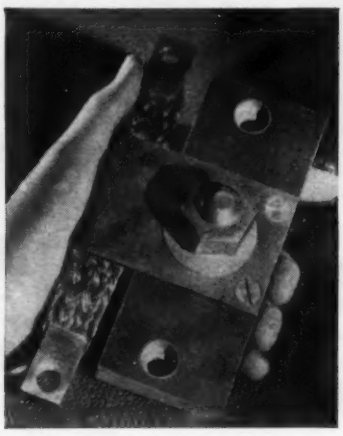
2 Here's power! Transformer coil has oversize rectangular winding—glass-insulated — with primary over secondary. Air duct prevents breakdown.



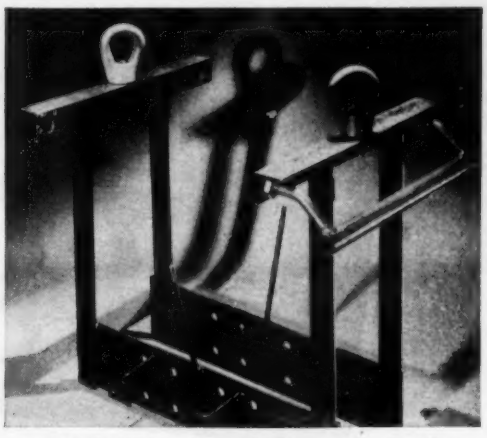
3 One inch movement of upper core — only 7 easy turns of wheel — covers entire welding range! Result: less wear, time saved!



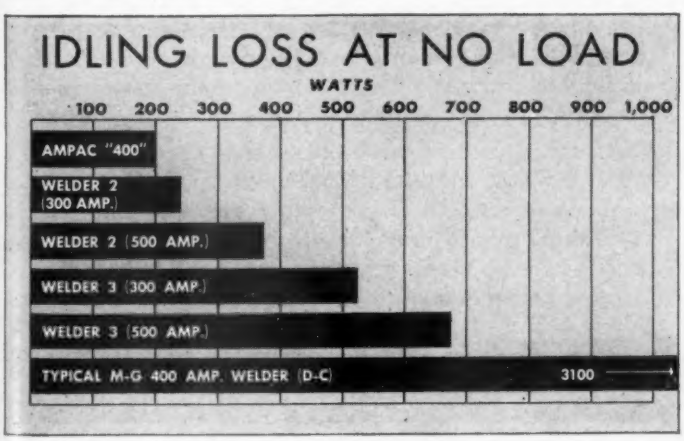
4 Lower core is 1-piece, U-shaped, die-punched silicon steel. Eliminates air gaps, cuts idling loss. Note 1-piece welded frame, heavy angles.



5 Extra heavy welding terminal will stand years of abuse. All permanent connections are *brazed!*



6 Sturdy lifting frame bolts to *core* for direct lifting of heavy mechanism. No load on case. Damage to case can *not* affect structure of electrical parts.


IDLING LOSS AT NO LOAD
WATTS
100 200 300 400 500 600 700 800 900 1,000
AMPAC "400"
WELDER 2 (300 AMP.)
WELDER 2 (500 AMP.)
WELDER 3 (300 AMP.)
WELDER 3 (500 AMP.)
TYPICAL M-G 400 AMP. WELDER (D-C)
3100

7 Compare Ampac with the 2 largest selling a-c welders and a typical d-c welder. At 2¢ per kw/hr, the d-c unit wastes $1.49 in a full day; Ampac's loss is less than 10¢! *And* — Ampac is more *efficient* than these welders!

A 1665

IT WILL pay you to get the full story on these brilliant new Ampacs. A new, patented circuit increases efficiency, cuts operating costs. Available in 200 amp units and up. Write for bulletins B6241, B6302.

ALLIS-CHALMERS

MILWAUKEE, WISCONSIN

BROACH LIFE BOOSTED 50%

SUNICUT

"eliminates 1 out of 3 broach changes . . . ups production"

Half again as many parts for war machines broached between every tool change! That's the answer a certain well-known metal-working plant made to the demand for increased war production . . . an answer made possible through the use of Sunicut sulphurized cutting oil as recommended by a Sun Doctor of Industry.

Previously the time lost in changing and resharpening broaches put a drag on production . . . so a Sun Oil Engineer was consulted. After a careful survey of conditions a change to Sunicut 196 cutting oil was advised . . . with the result that broach life increased 50%! One-third of the time formerly lost changing broaches is now employed productively in turning out more pieces per day.

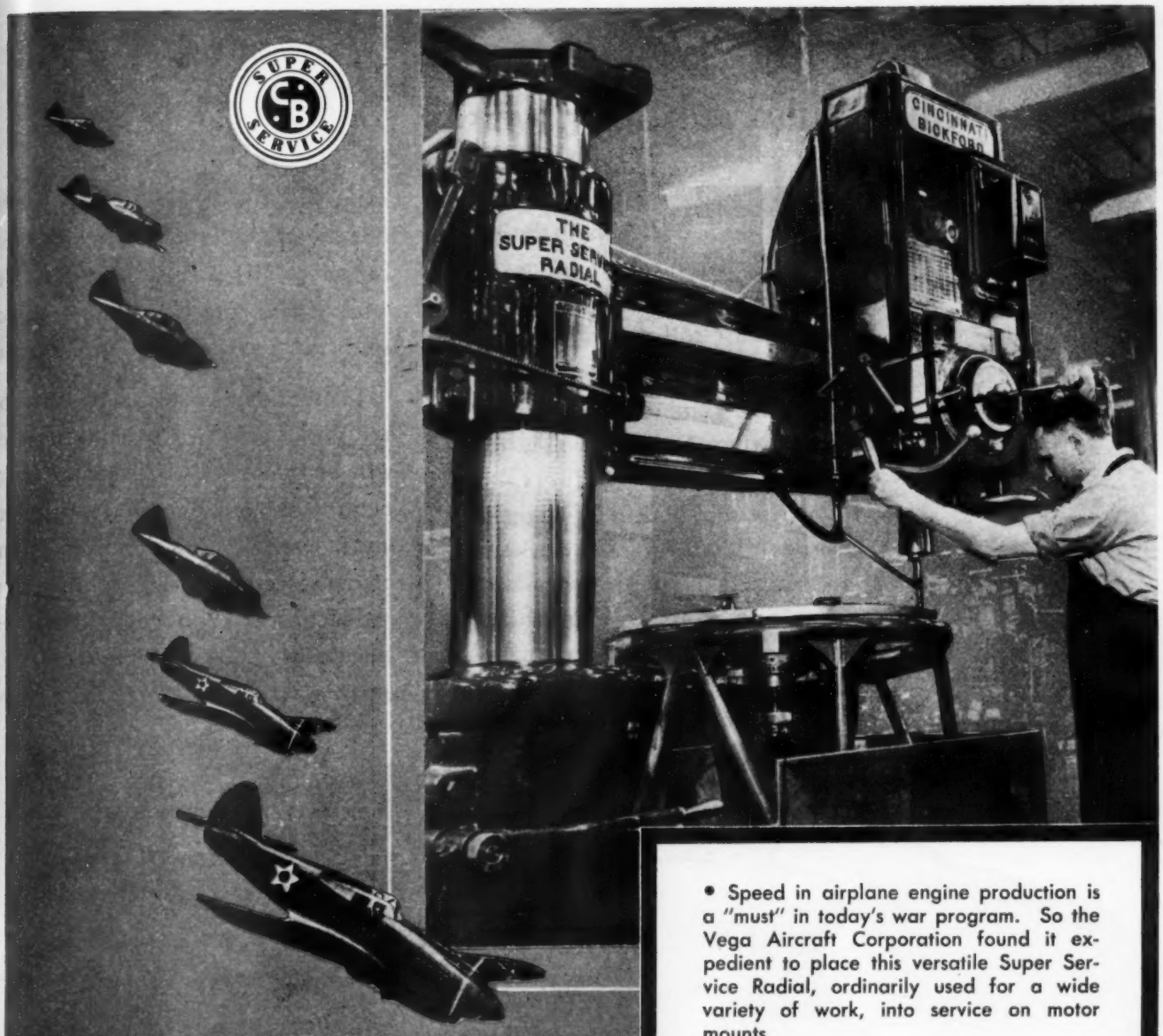
War plants everywhere—out to step up production—are finding the high heat-absorbing and metal-wetting qualities of Sunicut an important aid. On automatics, semi-automatics, gear-cutting machines as well as broaches, let Sunicut help you turn out a better job . . . faster . . . with maximum tool life. Discuss it with a Sun Doctor of Industry today. Write

SUN OIL COMPANY • *Philadelphia*

Sun Oil Company, Limited, Toronto, Canada

SUNOCO

SUN INDUSTRIAL PRODUCTS . **HELPING INDUSTRY HELP AMERICA**



MOTOR MOUNTS FOR VEGA AIRCRAFT drilled and reamed accurately in quantity lots... *with a* SUPER SERVICE RADIAL

• Speed in airplane engine production is a "must" in today's war program. So the Vega Aircraft Corporation found it expedient to place this versatile Super Service Radial, ordinarily used for a wide variety of work, into service on motor mounts.

Here we see the machine busy on this work. The motor mount is a ring about 3½' in diameter. Six holes are drilled and reamed 15/16" through a 2" boss and also spot faced and countersunk on both sides. A tolerance of .0015" is easily held. Time is approximately three hours per piece.

One of the reasons why this machine has proved so serviceable on the work assigned to it lies in the tact that 18 rates of feed and 36 useful speeds are instantly available to operate cutting tools at maximum efficiency.

You'll be interested in the whole story. Write for Bulletin R-24.

ARMY E NAVY

The CINCINNATI BICKFORD TOOL COMPANY

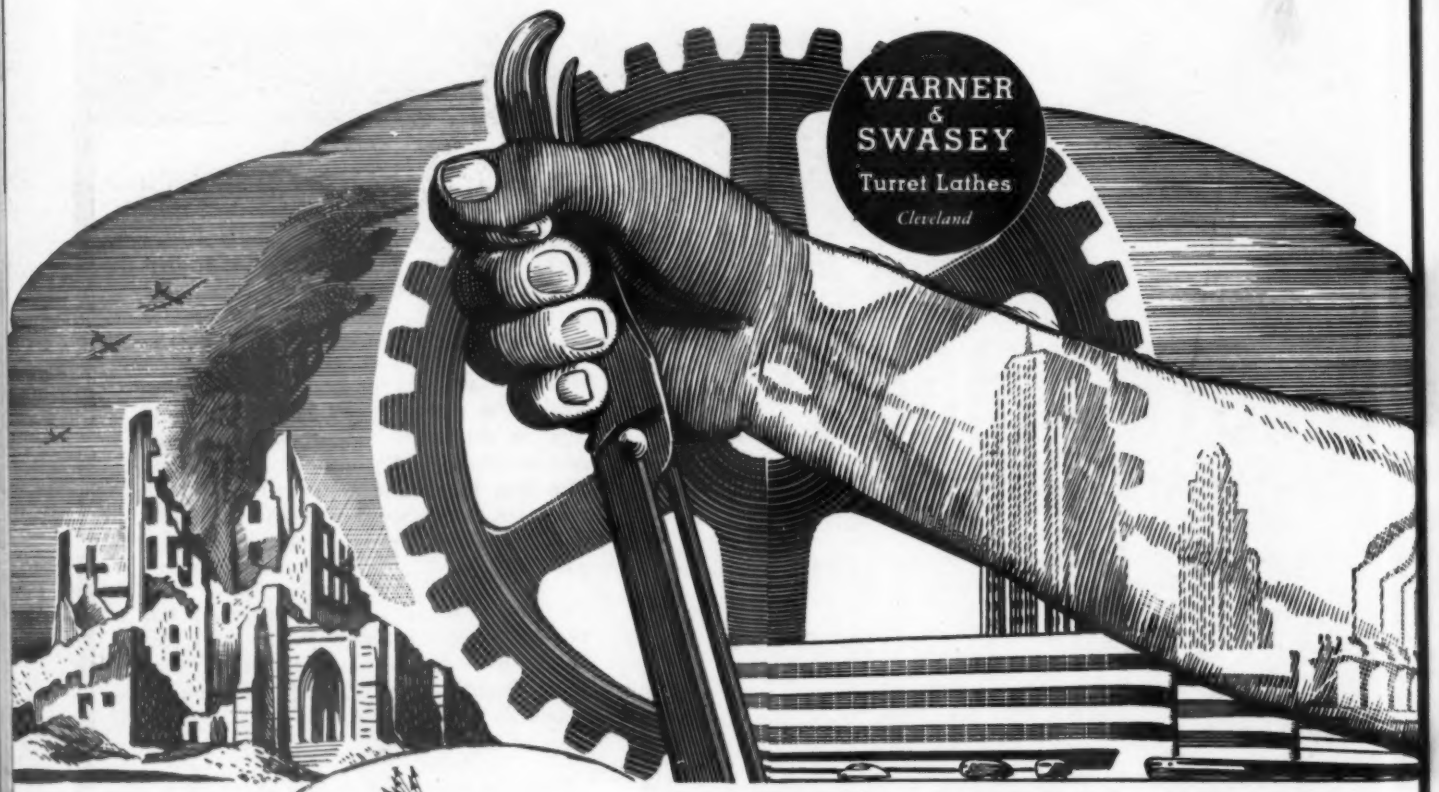
OAKLEY, CINCINNATI 9 OHIO, U. S. A.

Production that is winning a war will rebuild a better world

AMERICA has built the greatest productive machine for *war* the world has ever seen. Until victory is won it must roll on with undiminished power.

With the coming of peace the ingenuity that developed new techniques, new war products,—the enterprise that built new plants and trained millions of green workers in mechanical skills must not be scrapped along with war machinery. These great productive forces must be converted in full measure to more humane purposes. How quickly this is done will determine how quickly we can put soldiers and ex-warworkers to work, turning out the consumer goods so badly needed here and abroad.

Thousands of plants now busy on war goods are using machines which will be obsolete for peacetime competition. Machines are wearing out under continuous operation. Many plants to reconvert will require new production methods, new machines, and tooling. Look well at your plant today, from the viewpoint of tomorrow.



IT IS PATRIOTIC TO PLAN NOW FOR THE POSTWAR ERA

Warner & Swasey offers you practical help on postwar planning. We have a corps of engineers who are skilled in *all* machine operations involved in production of precision parts made of metal. They are helping many war plants improve methods and machines for greater production. They will continue to do so, but their services are also available to management interested in planning *now* for the future. Write Warner & Swasey, Cleveland 3, Ohio.

YOU CAN TURN IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

What's In This Issue

ARTHUR SCHWARTZ

Friction Makes Heat

Woodworking bandsaws may be used for high speed cutting, via friction, of sheet steel and armor plate; such has been the experience at Bell Aircraft Corporation. Arthur A. Schwartz, chief tool engineer of that firm, tells of the success which has met their experiments with friction sawing of metals. Turn to page 94.

Carbides Cut Stellite

Stellite with a hardness of 250 to 400 Brinell can be turned and faced with carbide-tipped tools when the proper precautions are taken. The Crane Company has developed procedures for rough turning the weld deposit on valve disks and counterboring valve seats. The manner in which this is being done successfully is described in an article on page 101.

Mountain to Mahomet

Under a recently instituted plan, inspection carts tour the plant of the N. A. Woodworth Company, checking gages in use, and replacing ones found to be unfit. Gerald E. Stedman tells how the system has increased production, eliminated rush periods at the gage crib and lowered the required gage inventories. His article is on page 105.

Films Train Workers

The lead article of this issue, starting on page 91, tells of United States Office of Education motion picture films prepared for aid in the training of war workers. Already over 30,000 reels of these pictures have been distributed, involving a total of over 46,000,000 ft. of 16-mm. film. Each is devoted to one specific operation on a machine tool, or to the theory and use of a single measuring instrument or small tool used in the metal-working industry. The use and value of these films, along with a list of completed subjects, are detailed in the article.

Shop Shots

Methods of reclaiming paint sludge, speeding production of control boxes, expediting gage checking and salvaging used corrugated boxes are some of the subjects treated in two pages of illustrations and captions supplying information of value to the shop. See pages 106 and 107.

R. T. GILLETTE J. F. YOUNG

Resistance Welding

Projection welding is described and the principles attendant upon its use explained in the third of a series of articles on resistance welding. R. T. Gillette, works laboratory, and J. F. Young, engineering general division, General Electric Company, are the co-authors. Page 96.

Surplus Disposal Plan

Calling the machine tool the "mother of industry," Charles A. Simmons, president of the Simmons Machine Tool Company, presents a plan to insure the survival of the industry that produces it, and on the cornerstone of which "rest the six essentials of successful total war." Starting on page 102, Mr. Simmons' article outlines a five-point plan for the handling of postwar surplus machine tools and discusses the manner in which it may be carried into effect.

CHARLES A. SIMMONS

Shaving Is Closer

By shaving instead of grinding gears, the Ford Motor Company is producing them more quickly and of greater hardness. From the experiences gained in this respect, Ford personnel believe that a shaved aircraft-engine gear can be made equal to a ground one. Page 113.

Mills Clamping Surfaces

When a Canadian small arms plant started to make bodies for the Boys anti-tank rifle, surface grinding was used to obtain accurate clamping surfaces. Too costly and not too satisfactory, this method was later replaced by face milling with fly cutters. The article on page 117 tells how equipment was saved.

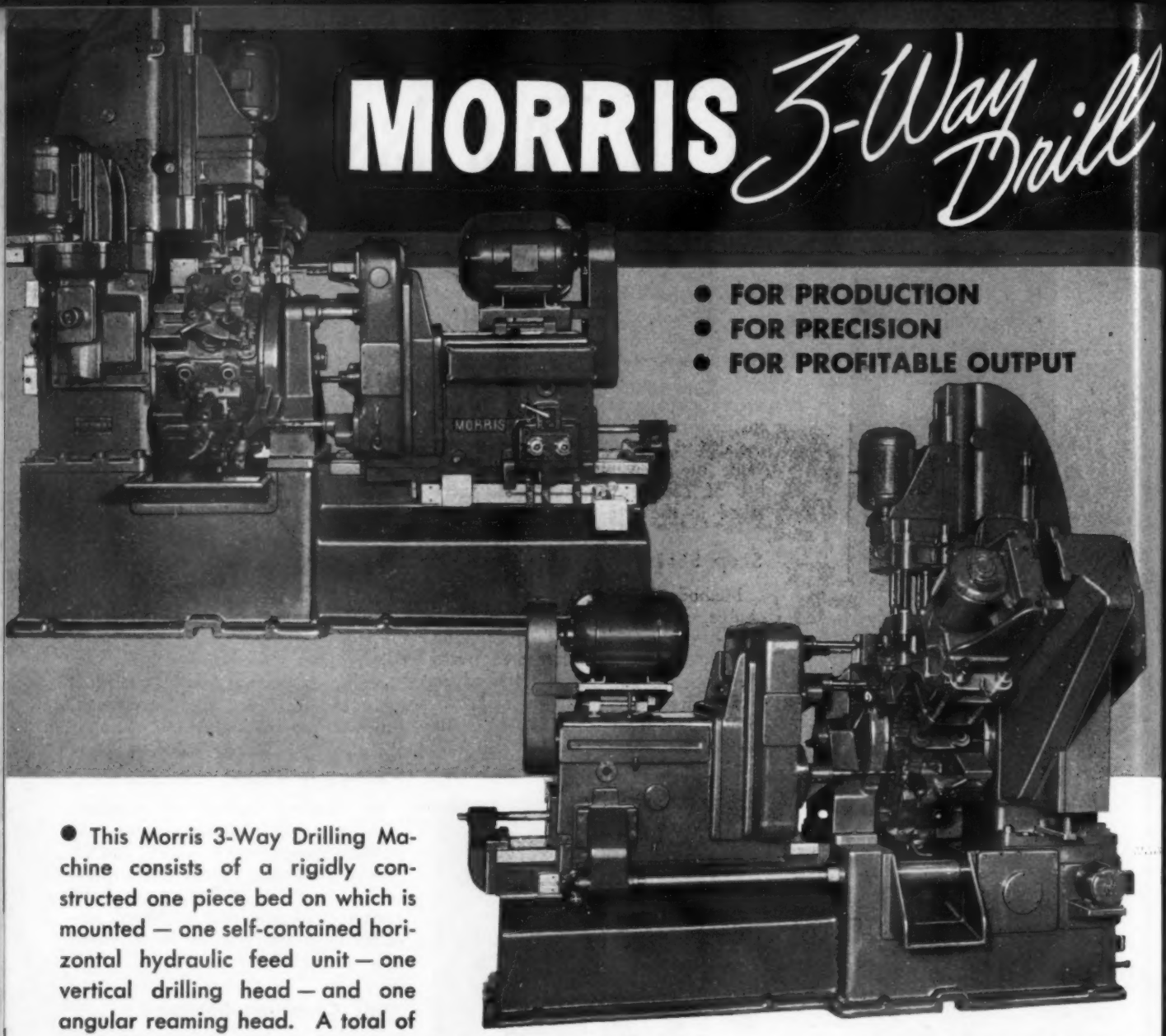
COMING

What the Dura Division, Detroit Harvester Company, has learned in production of 20-mm. steel cartridge cases will be detailed by Major Van Ness of the Office of the Chief of Ordnance. Originally the Toledo plant made the brass case, but converted its equipment in record time.

With conversion facing many an equipment builder, Warner & Swasey's ideas of how to keep capacity for machine tools and use the excess for subcontracts are must reading.

MORRIS *3-Way Drill*

- **FOR PRODUCTION**
- **FOR PRECISION**
- **FOR PROFITABLE OUTPUT**



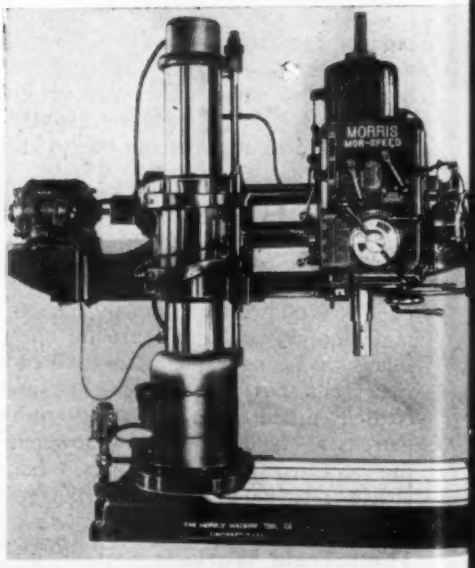
● This Morris 3-Way Drilling Machine consists of a rigidly constructed one piece bed on which is mounted — one self-contained horizontal hydraulic feed unit — one vertical drilling head — and one angular reaming head. A total of twelve spindles operate on each piece before unloading.

The machine is simple to operate as the operator merely locks work into holding fixture by means of a hand clamp. The indexing is accomplished automatically.

This Morris 3-Way Drill was designed to drill and ream automobile gear shifter housings — accurately — quickly — at low cost.

Perhaps you are thinking about production for the future when costs will take on more critical importance than at present when production is your first consideration.

Consult us on your problems. We have both the experience and facilities to help you.



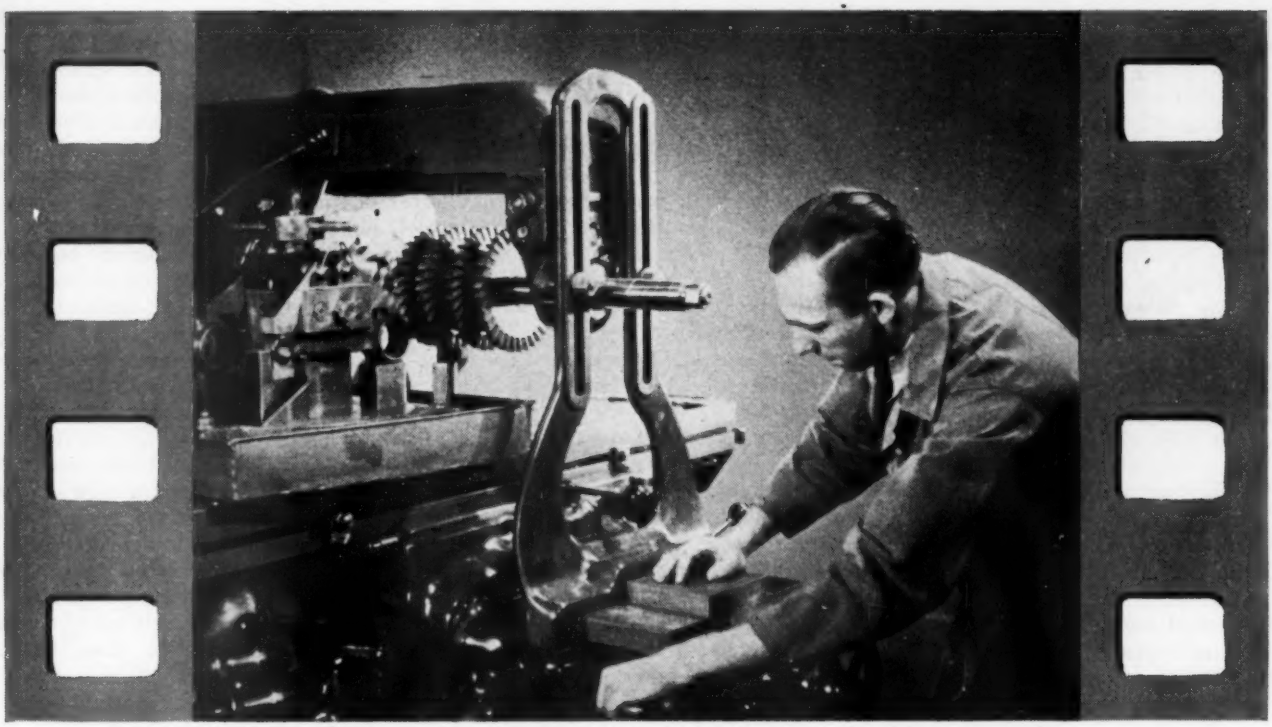
Builders of **MOR-SPEED** *Radials*

The MORRIS *Machine Tool Co.*

CINCINNATI, OHIO

American Machinist

ESTABLISHED 1877 • BURNHAM FINNEY, EDITOR



Narration in these training pictures describes each operational step and tells why each is necessary

Movies Go To Work

A pattern for motion pictures has been developed that shows minute steps in the operation of machines. These movies have cut training time as much as 50 percent when used properly

MOTION PICTURES made and distributed under the direction of the United States Office of Education have been playing a prominent role in the training of workers in war-industry plants. Unlike the usual industrial movie that deals with the many ramifications of a single subject, each U.S.O.E. picture is devoted to one specific operation on a machine tool, or to the theory and use of a single measuring instrument or small hand tool used in the metal-working industry. The complete list of pictures now available is given in the table. To date, over 30,000 reels of these pictures have been distributed, involving a total of over 24,000,000 ft. of 16-mm. film.

Originally, these sound films were exploratory and to a large degree experimental. They have four objectives: (1) To provide a trainee with a demonstration of a single but complete operation on a machine tool. (2) To show through the use of specialized motion-picture techniques, such as animation, magnified close-ups and slow motion, those basic principles difficult to explain by actual physical demonstrations. (3) To explain and show from the operator's angle those points in machine operation which normally could be given to a relatively small number of trainees at a single time. (4) To give to the trainee a new appreciation of the skill and care that are necessary in the operation of a machine by showing him how a skilled operator performs the job.

In attaining these objectives it was necessary to establish a pattern entirely new for this training medium. For example, the first picture in the series on the engine lathe, "Rough Turning Between Centers," opens with the operator studying a blueprint of a 3 in. diameter shaft 6 in. long. In succeeding sequences he is shown measuring the size of the rough stock, cleaning and oiling the lathe, applying the dog to the workpiece, lubricating the tailstock center hole in the stock, applying it between centers, selecting and setting up the cutting tool, selecting and setting speed and feed, machining the stock to size up to the dog, reversing the stock between centers, and finishing it to size. Narration describes not only each operational step, but also relates the reason why each step is necessary.

Animation is used in the picture when the camera is incapable of depicting information vital to a thorough understanding of any point in the job;

this is the case when describing the meaning of cutting speed and feed. Emphasis is placed throughout the picture on safety and cleanliness in the operation of the lathe.

Each succeeding picture in the lathe series shows work of a more intricate nature until, at the end of the series, the trainee has an understanding of methods used in setting up and performing practically all basic jobs on this machine tool. He is shown how to turn work of two diameters, to drill, bore and ream work held in a chuck, to turn tapers with the compound rest, the taper-turning attachment and by offsetting the tailstock and finally how to cut National and Acme threads. Specific instruction is given in each instance on how to set the cutting tool, set the depth of cut with the cross-slide and compound micrometer collars, and how to use calipers, micrometers and gages in checking dimensions.

The same pattern is followed in the series of motion pictures on the milling machine, the shaper, the radial drill, the vertical drill, and the vertical boring mill. Also, those pictures depicting the theory and use of measuring instruments, as well as hand tools used in the metal-working industry, follow the same basic pattern.

In the picture on the micrometer, for example, the application of this measuring tool is compared with the use of a steel rule and the need for precision measurement is emphasized.

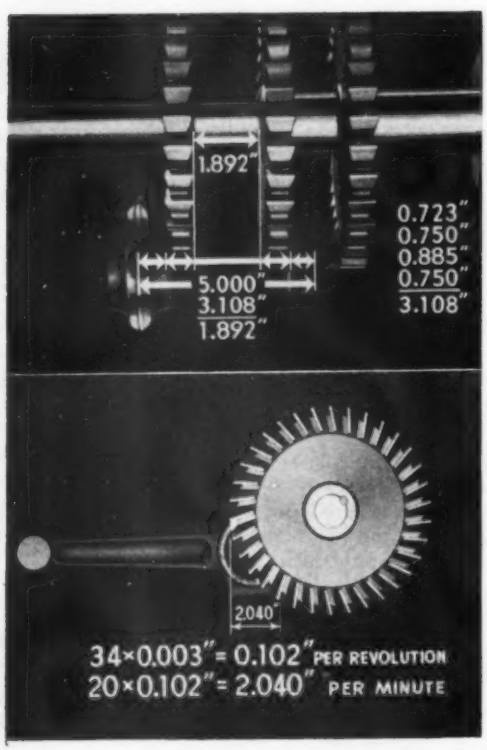
Then the micrometer is shown in animation to describe the function of its principal parts. The pitch of the thimble screw is first shown, and one thread is translated into a straight line representing one-fortieth of an inch. This line is then represented as 0.025 in. and broken into 25 parts each 0.001 in. long. Then by continued animation this line is wrapped around the thimble to reveal how the micrometer can make readings of 0.001 in. Finally, the barrel scale is developed and the principle of micrometer measurement is described. Later in the picture is shown specific uses of the micrometer in making inside and outside diameter readings and in obtaining depth of holes. Emphasis is placed on the use and care of the micrometer in order to retain its accuracy.

Similar procedure is used in describing the theory and application of the vernier scale. A simple five-part vernier is first used without reference to units of measurement in describing the theory. This is then applied to a ten-part vernier and a 25-part vernier, the latter being expanded into its use on a vernier height gage. A simple problem in laying out holes in a steel plate describes the application of the vernier height gage. The applications of the vernier scale to the micrometer and vernier calipers are then shown in animation, followed by the actual use of these measuring tools in checking the diameter of machined workpieces. The same treatment is given those pictures on the steel rule, height gages and standard indicators, and fixed gages, the latter including snap, plug, ring and thread types.

One of the important series of pictures is devoted to operations on the drill press. The trainee is shown how to layout holes in a workpiece and drill to that layout. Machine tapping of the holes is also included. Important features in the operation of the machine are fully covered, beginning with the rigid set-up of the work and proceeding in logical order to the selection of the drill, placing the drill in the spindle, selecting spindle speed and drill feed, and finally drilling the hole accurately to the layout. Later in the series, the application of drill jigs is covered, until at the end of the group of pictures the trainee has been shown how to perform a large variety of jobs on this machine tool.

The greatest benefit is derived from these pictures when a portion of the training program is based specifically on their use, rather than showing them to trainees as an additional feature of an existing program. Some users show the pictures, then provide time for each student to perform a similar job on a machine in the school, and finally show the picture again. This is followed by a

Animated drawings in the movies explain tool set-ups and selection of speeds and feeds



U.S.O.E. MOTION PICTURES

Subject	Length	Cost
PRECISION MEASUREMENT:		
Steel rule	500	$12.28
Micrometer	550	13.32
Fixed gages	600	14.37
Vernier scale	675	15.93
Height gages and standard indicators	450	9.77
ENGINE LATHE:		
Rough turning between centers	550	13.32
Turning work of two diameters	500	12.28
Cutting a taper with the compound rest and with the taper attachment	400	8.73
Drilling, boring and reaming work held in chuck	400	8.73
Cutting an external National fine thread	450	9.77
Turning a taper with the tailstock set over	625	14.89
Cutting an external Acme thread	575	13.84
MILLING MACHINE:		
The milling machine, principles of operation	275	6.13
Cutting keyways	525	12.80
Straddle and surface milling to close tolerances	975	22.93
Straddle milling (work held in a fixture)	625	14.89
Plain indexing and cutting a spur gear	925	21.88
VERTICAL BORING MILL:		
Rough facing, turning and drilling	1125	26.05
Rough facing, boring and turning a shoulder	800	18.53
Facing, turning, boring, grooving and chamfering	1125	26.05
SHAPER:		
Cutting a keyway on a finished shaft	475	11.76
Machining a rectangular block	900	21.36
DRILL PRESS:		
Machining a tool-steel V-block	750	17.49
Drilling a hole in a pin with the sensitive drill	375	8.21

question-and-answer session to clarify doubtful points. When used in this manner, it is reported that training time has been cut to 60 percent of that normally required. Those pictures showing the theory and use of measuring tools have cut training time in some instances as much as 50 percent.

A total of 48 pictures were made by the U. S. Office of Education under the direction of Dr. C. F. Klinefelter, assistant to the commissioner, Floyde E. Brooker, director of visual aids, and J. W. Barritt, technical advisor. They were made under contract by private motion picture companies at an average cost of less than $3,500 each. Technical accuracy of the pictures were checked by volunteer committees composed of training specialists from technical schools and industrial plants, a committee of five members working with each of the producing companies.

When the pictures were completed, a contract was let to Castle Films, Inc., New York, N. Y., for their distribution, and it is through this source that they are now available. All pictures are on 16-mm. sound film and each one is no more than one reel long, averaging about 550 ft. The actual length of each picture, together with its cost, is given in the table.

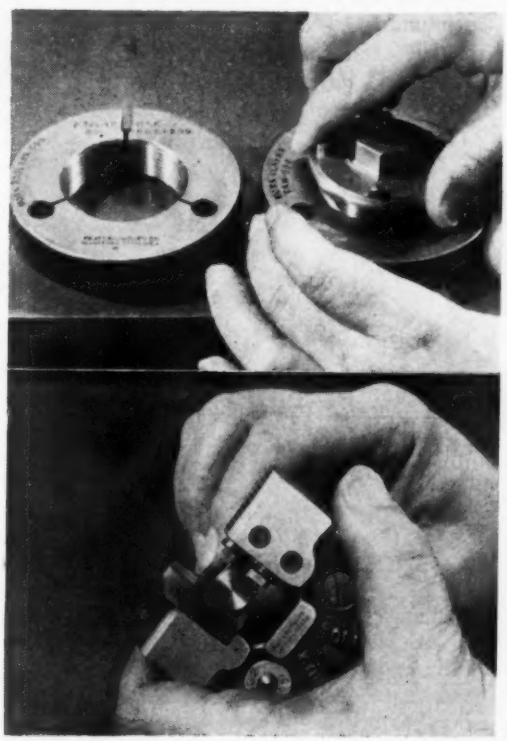
The success of these pictures, as evidenced by the distribution of over 30,000 reels, has prompted an additional appropriation from Congress to the Office of Education for the making of 150 more movies, which are currently in production. Each of these will be released in the form of a complete teaching unit, including the motion picture, a slidefilm and a manual. This slidefilm will be comprised of still pictures with questions to emphasize the important steps in each movie, while the manual will advocate the best specific use for the motion picture and the slidefilm, and will serve as a guide for the instructor in selecting specific items in each picture for detailed classroom discussion.

Correct set-ups are emphasized in all of the training motion pictures

FOR THE METAL TRADES

Subject	Length	Cost
Locating holes, drilling and tapping with vertical drill	650	$15.21
Countersinking, counterboring and spotfacing with the vertical drill	725	16.97
Drilling and tapping with the radial drill press	675	15.93
Drilling to a layout and spotfacing with the radial drill	550	13.32
SINGLE-POINT CUTTING TOOLS:		
Fundamentals of side cutting tools	400	8.73
Fundamentals of end cutting tools	450	9.77
BENCH WORK:		
Cutting threads with taps and dies	700	16.45
Scraping flat surfaces	500	12.28
Fitting and scraping small bearings	725	16.97
Reaming with straight hand reamers	725	16.97
Reaming with taper hand reamers	550	13.32
Centering small stock	425	9.25
Laying out small castings	575	13.84
Fundamentals of filing	450	9.77
SHIPBUILDING:		
Preparing and setting a keel block and bottom cradle	650	15.41
Innerbottom section: Subassembly of a closed floor. Subassembly of an open floor	650	15.41
The innerbottom: Setting up floors and longitudinals	650	15.41
Side frames: Subassembly of a web frame	625	14.89
Deck girders: Subassembly	525	12.00
The Deck: Setting a web frame and a transverse beam	625	14.89
Bulkhead: Laying off the boundary stiffeners, water lines and buttock lines	650	15.41
Bulkhead: Laying off and fitting a center-line stiffener	575	13.84
Bulkhead: Setting a transverse watertight bulkhead into the hull	625	14.89
Deck plates: Regulating and setting	575	13.84

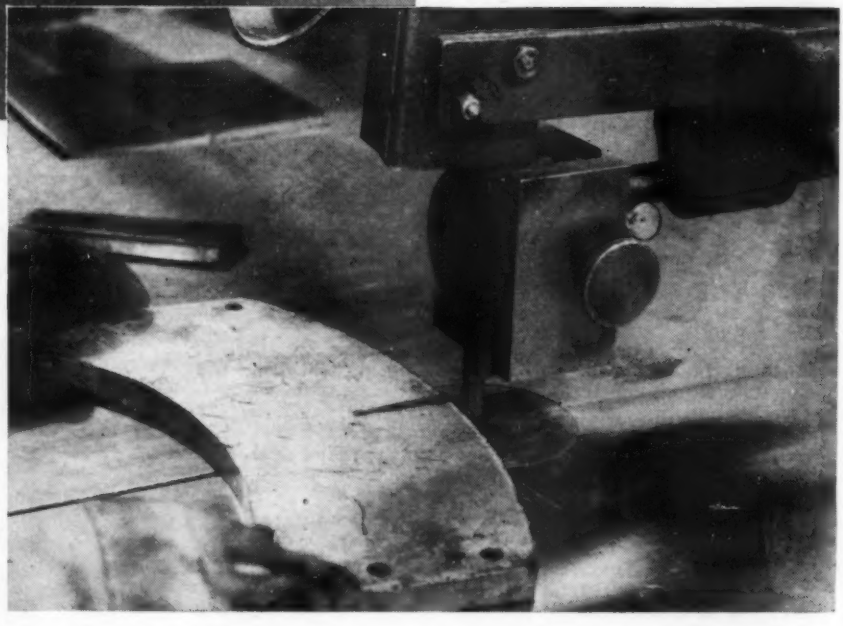
One of the series of pictures shows the theory and use of precision measuring tools



Metal Sawing By Frictional Heat

BY ARTHUR A. SCHWARTZ, CHIEF TOOL RESEARCH ENGINEER, BELL AIRCRAFT CORPORATION

Formed sheet sections for war planes are friction sawed with carbon steel blades traveling at 12,000 ft. per min. at the Bell Aircraft Corporation's plant. In the operation shown a hole in a formed part is being roughed out



While most of the metal sheet sections sawed at the Bell Aircraft plant are under 1/8 in. thick, the process also is used for sawing hard armor plate and carbon steel die sections up to 1 1/4 in. thick

High speed for friction sawing obtained by using woodworking cutting sheet steel, armor plate bandsaws. Use this method for

HEAT GENERATED by friction is one of the oldest means by which metals can be sawed, yet its possible applications in machine shops have not yet been fully explored. Interest in the method was first developed about the turn of the century in connection with the friction sawing of heat-treated armor plate.

At that time this method was claimed as the only practical means of cutting and trimming such hard steels. Friction sawing also was used about that time for sharpening bush hammers employed in concrete construction. A disk of boiler plate revolving at high speed was used to burn away the material when sharpening these hammers. Friction saws have also been employed for many years in rolling mills for cutting off red-hot steel rails and bars. The peripheral speed of the friction disks used for these cut-off operations usually is about three miles per minute and a large rail can be cut off in less than one second.

Some interesting results have been obtained at the Buffalo plant of the Bell Aircraft Corporation in using bandsaws for high-speed friction sawing of both ferrous and non-ferrous materials. This method now is being used principally for sawing sheet stainless steel and aluminum, trimming formed parts made from these materials, and for cutting armor plate and carbon steel to shape. It has been

found particularly suited to cutting steel plate into shape for blanking and trimming dies used in aircraft parts production. In experimenting with this method, we have cut plate glass with bandsaws, but have not been able to cut soft rubber or Stellite.

Because extremely high band speeds are necessary when friction sawing with a bandsaw, Tannewitz woodworking bandsaws are used. Band wheels on these machines have sufficient strength to withstand the high speeds required. Strong steel housings are provided to inclose the blade so as to avoid danger to operators when the band eventually breaks. We now operate these saws with a minimum blade speed of 12,000 ft. per min., and use ordinary carbon steel blades with a wide set and a soft spring temper. For ordinary work on sheet and thin plate materials, a 10-point raker set blade works well. An 8-point band is better for heavier thicknesses of materials, but cuts slower. With a 10-point band traveling at 12,000 ft. per min., a total of 1,440,000 teeth pass through the kerf each minute. This is 24,000 active teeth per second, and in material of 0.20 in. thickness each tooth is in the kerf for only 1/12,000 second. This speed prevents heat generated by friction from traveling into the adjacent material to any great extent.

Blade Speed Carries Heat Away

Heat in the saw blade is spread over its entire periphery, and radiation and convection cool the blade for about 99.8 percent of the time. Hence, while the points of the teeth are rubbed or burned quickly in this friction sawing operation, the blade itself does not increase in temperature appreciably. The friction of the saw teeth on the metal being cut not only melts the metal, but it turns it into gas, as can be noted by the color of the flame under the sawing point. The speed is so fast the heat is carried away before it can travel to the adjacent metal.

Since the friction sawing of metals with a bandsaw blade depends upon the temperature developed by action of the blade rubbing on the material to be cut, and because variations in the hardness of the saw and the hardness of the material being cut does not affect the burning action appreciably, it is best to select a saw on the basis of its ability to stand the constant flexing around the wheels for the longest time. Also, experience shows that it is best to keep a wide set in the teeth to minimize side friction on the blade. It would be possible to use this blade without any teeth, except for side friction in the kerf. With teeth cut in the blade, the kerf can be widened for the passage of the blade by the usual saw setting method. Spaces between the teeth carry oxygen-rich air into the cut to insure maintenance of the burning action.

When adapting a woodworking bandsaw for friction sawing of metals, it is desirable to inclose the blade in strong steel housings which will prevent the blade from flying about when it breaks. The operator is shown sawing two ½ in. thick pieces of armor plate

We have found that as the limit of thickness in the material is approached there is difficulty in starting the cut. However, a thick piece can be tipped so as to present for an instant a shorter kerf. The flame will light up and then the cut can proceed with ease. In cutting steel, the flame has a cobalt blue-white color, indicating that oxygen is combining with the iron. We have found that harder steels have a higher coefficient of friction and therefore will cut more rapidly by this method. With other metals the speed of sawing and the thickness that may be cut with a given speed and power input varies considerably. In high-carbon steels, some of the surfaces near the edges may become hardened if insufficient feed is used. When proper feed and speed are maintained, this hardening should never exceed 0.001 to 0.002 in. in depth. In some of our experiments we have cut files without drawing their temper.

At the present time it is not possible to give definite information as to the type of saw to use for various metals, nor is it possible to develop a table of the most efficient speeds and feeds for the different materials which can be cut and for different thicknesses of these materials. Now feed is measured by pressure against the blade, and this pressure is governed by the resistance of the blade to bending or buckling. A ½ in. wide blade, 0.025 in. thick, took 17 lb. pressure when sawing 5/16 in. thick armor plate. A ⅝ in. wide and 0.032 in. thick blade was used on the same material with 22 lb. pressure. The speed of cut resulting from these pressures was 12 in. and 17 in. per min., respectively. The second blade also was used on ⅝ in. thick hard armor plate with 25 lb. pressure. In this case, the material was fed at 16 in. per min. We have cut hard steels 1¼ in. thick. Reports from other companies using this process, and employing heavier saws with higher speeds, indicate that much heavier sections can be cut.

Since we are using this method principally for cutting sheet materials employed in airplane construction, the most important feature of the process is the ease with which such materials can be cut. This is true whether the sheet rests on the saw table or is held by hand above the table. As the saw does not "grab" in the work, it is possible to trim irregular shaped pieces easily and rapidly when they are supported above the saw table by the operator's hands. In such operations the speed of cutting, that is the rate of feed, is determined by the skill of the operator. The process has proved so effective that we now have about 18 of our bandsaws set up for high-speed friction-cutting operations.

How to Use Resistance Welding

BY R. I. GILLETTE, WORKS LABORATORY, AND J. F. YOUNG,
ENGINEERING GENERAL DIVISION, GENERAL ELECTRIC COMPANY

III — Projection welding is a special kind of spot welding in which the shape of the mating parts locates the fusion points

PROJECTION WELDING is a modification of spot welding in which the current and pressure are localized at the weld section by the use of embossed, machined, or coined projections on one or both pieces of the work. When the parts can be prepared in this way, the process has the following advantages:

(*a*) The electrodes are flat, or formed, and contact the parts over considerable area. This results in easier electrode maintenance, more accurate alignment of parts, and simplifies the construction of jigs and fixtures.

(*b*) By using several projections within the area of the electrodes, several welds may be made simultaneously, thus saving handling time and giving increased output for each machine stroke. It is also possible to make two or more welds closer together than by spot welding as the proximity effect or shunting is eliminated.

(*c*) Even for a single weld between parts, welding conditions are easily controlled by the use of a projection; the location of the weld, its area and the surface contact conditions are more certain than when using regular spot welding.

(*d*) Special parts and assemblies may be welded. For instance, studs with dowel ends are easily assembled to plates; headed pins can be welded through holes in levers, leaving the lever free to move after fastening; and nonmetallic parts can be fastened to metal by similar means. It is also frequently possible to make projection welds at sections which are inaccessible to spot welding electrodes.

Perhaps the most important step in projection welding is the design of the projections. Practice has indicated that the weld must start with a point or line contact and have a continuously increasing cross-section. The majority of the projection welds made involve the assembly of punched, stamped, or formed parts which permit making the projections as part of the preforming. The projections shown in cross-section in Fig. 11 (*a*) and (*b*) are suitable for welding most flat or irregular stampings. Oblong, square, ovai and other shapes may be used, but for flat pieces or where the projections contact flat pieces, the round form having a diameter of one or two times the thickness of the sheet gives best results. It also has advantages in simplicity of punch and die design.

An elongated projection, Fig. 12, is particularly suitable where contact must be made with a curved surface or at other places where a slight longitudinal or transverse movement may occur. Such a projection assures ample contact surface in the direction of the impending movement. Projections having the cross-section illustrated in Fig. 11 (*c*) should be avoided since the metal is partially sheared, and the plug may become loose during welding or it may burn off on a line with the upper surface of the sheet.

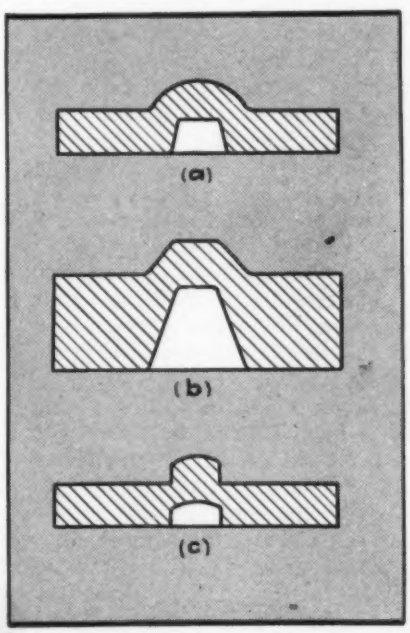


Fig. 11—Projections may be made in a variety of cross sections: (a) for 24 to 13 gage sheet metal; (b) for 12 to 5 gage sheet material; and (c) incorrect type of projection

Generally, the projection should be made on the thicker piece when material of different thicknesses is used, and its height should be from 10 to 90 percent of the thickness of the thinner material. The low projections often give satisfactory strength with minimum marking or distortion, and the higher ones give greater strength. If different materials are to be welded, the projections are usually produced on the one with the higher conductivity.

Annular, or ring, projections are often used on screw machine parts such as bosses and studs which are to be welded to sheets up to approximately 3/32 in. thick. For thicker sheets, a dome type of projection seems to work out better. Fig. 13 (*a*) shows the correct type of annular projection. When the outside of the part must fit tight agains the surface of the sheet, a recess may be left around the projection to provide for the extruded metal. Annular projections are frequently used to provide a pressure-tight weld around a hole. The seal weld in all-metal radio tubes is an example of such an application.

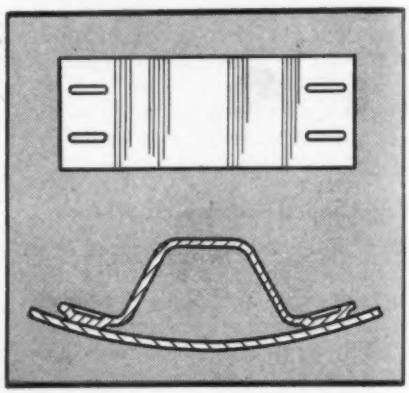
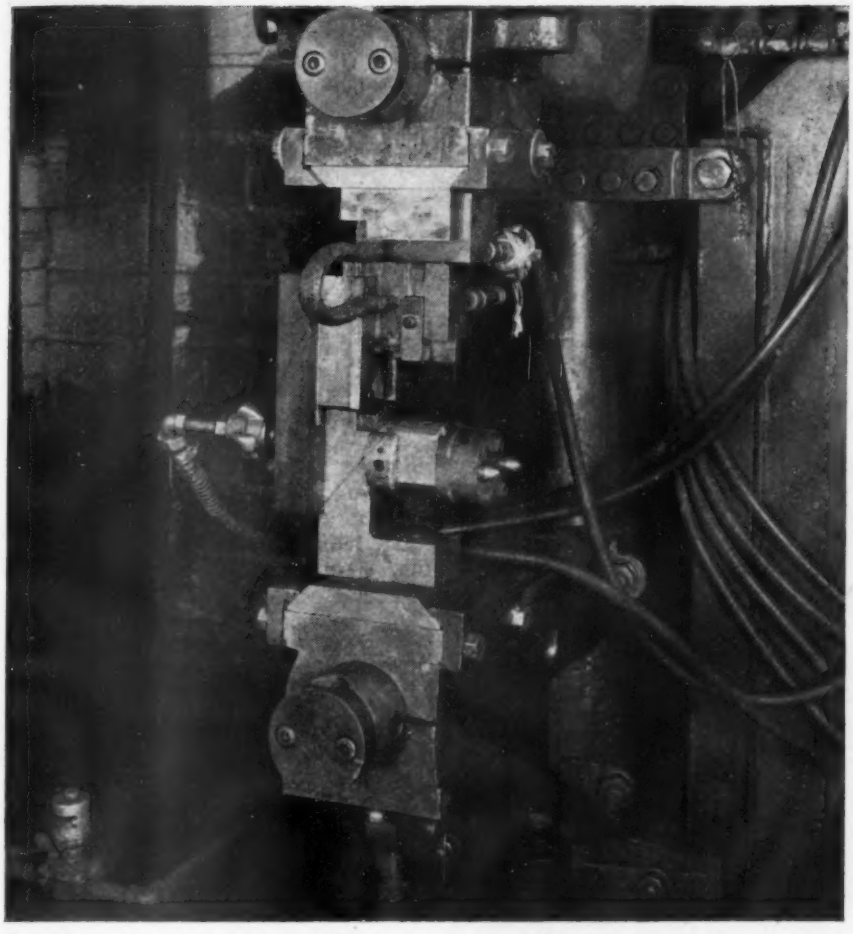


Fig. 12—Elongated projections assure ample contact surface for welds between curved members

Crossed wires as used in most types of wire goods provide ideal projection-welding conditions, and similar conditions can often be obtained when forming parts to be welded. Examples



For accurate projection welding of ears to a coupler case, the latter is placed over a horn and the upper electrode operates within guides

of welds of the cross wire type are refrigerator shelves, baker and butcher baskets, lampshade frames, soap dishes, bird cages, reinforcing mats for concrete roads and many other similar wire articles of most any combination of wire sizes.

Studs, either plain or threaded, are usually prepared with a spherical dome, using approximately a 1½-in. radius on the end to be welded. The round head of a screw without a slot is a very good projection to weld. Special nuts and bolts containing projections are available for welding to sheets when threaded bosses or threaded through-studs are needed.

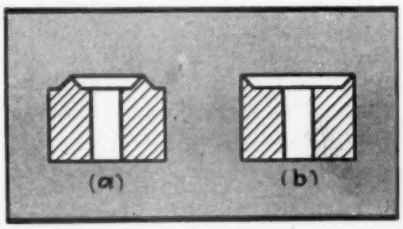


Fig. 13—Annular ring projections are used for bosses, studs and where tight seals are required, as in rado tubes. Correct design (a); incorrect (b)

In many types of electrical equipment, silver contacts are projection welded to various mountings. These contacts are prepared for welding either by forming a projection directly on the back of the silver or by using steel- or monel-backed silver contacts, with the backing material formed in a dome. The welding method of attaching contacts is in common use since it saves the silver that would be used in the stems if they were riveted, and the welding operation is less costly than heading over the rivet.

Projection welding applies to nearly all the metal combinations that can be spot welded, but the design must be strong enough to support the projection. Combinations of copper and the brasses should be considered difficult to weld on a production basis by this method, and aluminum is not readily welded. It is possible to weld the copper-base metals to steel, however, if the projections are made on the steel part. Coated stock, such as galvanized iron, terne and tinplate, can be welded successfully with special procedure.

The size of projection welds and spot welds is determined by the material, the thickness of the material and the desired degree of freedom from marking. The number of welds is in turn dependent on the size of the individual welds, the total strength required, and in some instances on the reliability of the manufacturer—sometimes a few extra welds being added for safety. No definite rule can be given for the number or size of welds; each design must be based upon the factors controlling it.

When making projection welds, it is essential to use equipment with sufficient capacity to make the welds in from 5 to 30 cycles, particularly when making multiple welds. If this is not done, the projection may not heat evenly enough to develop the full strength of all the welds.

One of the most famous projection-welded products was the Ford wire wheel which was produced for several years. Millions of spokes were projection welded at both ends, to the rim and hub of the wheel without passing through either. There are a great number of other applications, including household refrigerators, distribution transformer tanks, brackets, and lifting hooks. The possibilities seem only limited by the ingenuity of the designer to foresee and make use of the process.

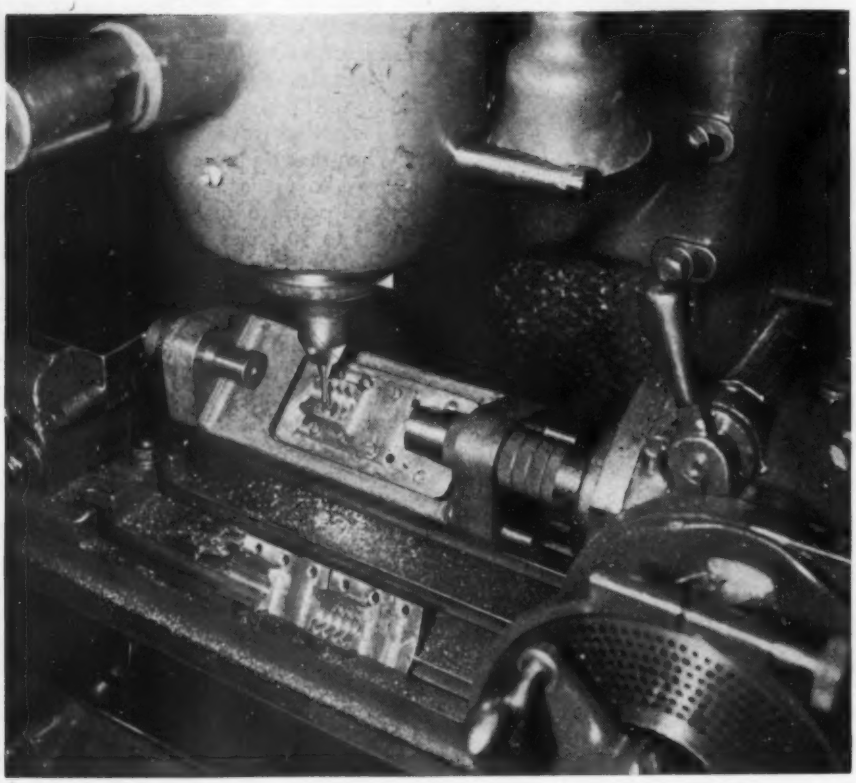
Thread Grinding in One Pass

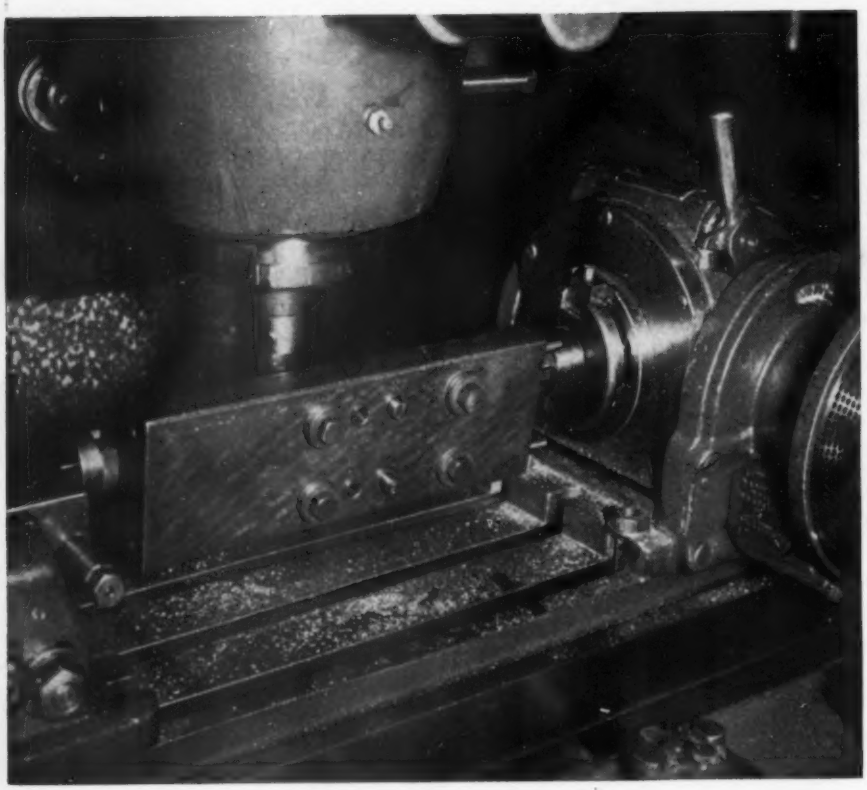
As previously reported, the Ford Motor Company developed a water-cooled arbor for locating the Pratt & Whitney cylinder barrel for several operations. The use of this arbor has been extended to grinding the electric thread with several beneficial results.

After finishing the O.D., the part is left on the arbor and eventually reaches the thread grinder. Here the female operator need only put the arbor between centers and push a handle. Discontinuance of female centers for directly holding the piece avoids applying a pressure that tends to collapse the cylinder walls. Hence there are no longer any flat spots at any point and the thread form is perfect for the full 360-deg. circumference of the piece. Thus, quality is improved about 50 percent, and diamond wear is reduced by one-half. Moreover, the thread is ground in one pass instead of three. Production per machine at 85 percent efficiency is now rated at 15 barrels per hour instead of five.

Toolroom Milling—V

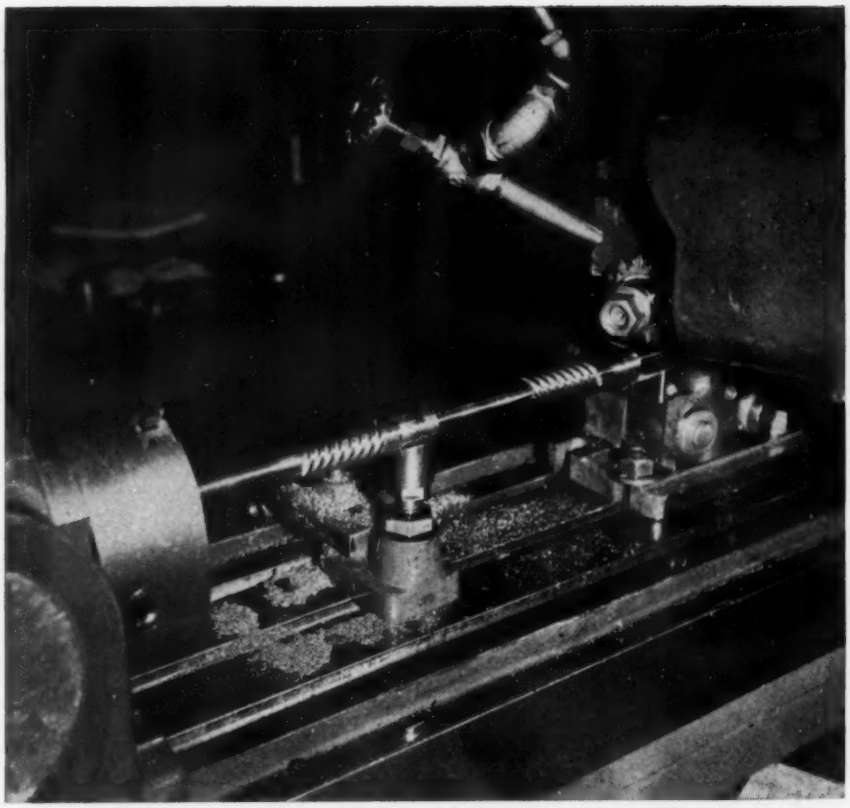
BY H. A. FROMMELT, KEARNEY & TRECKER CORPORATION

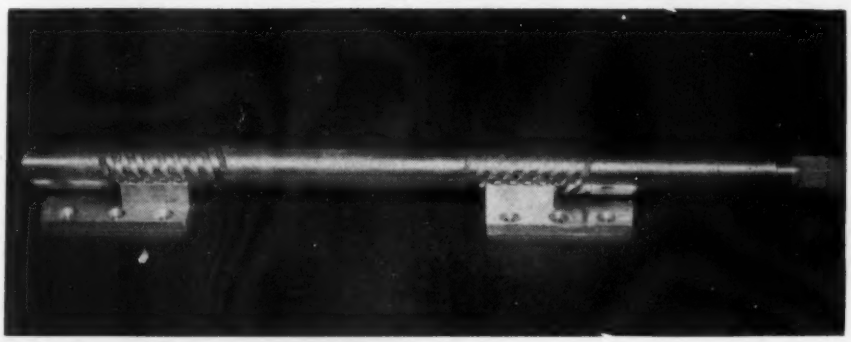


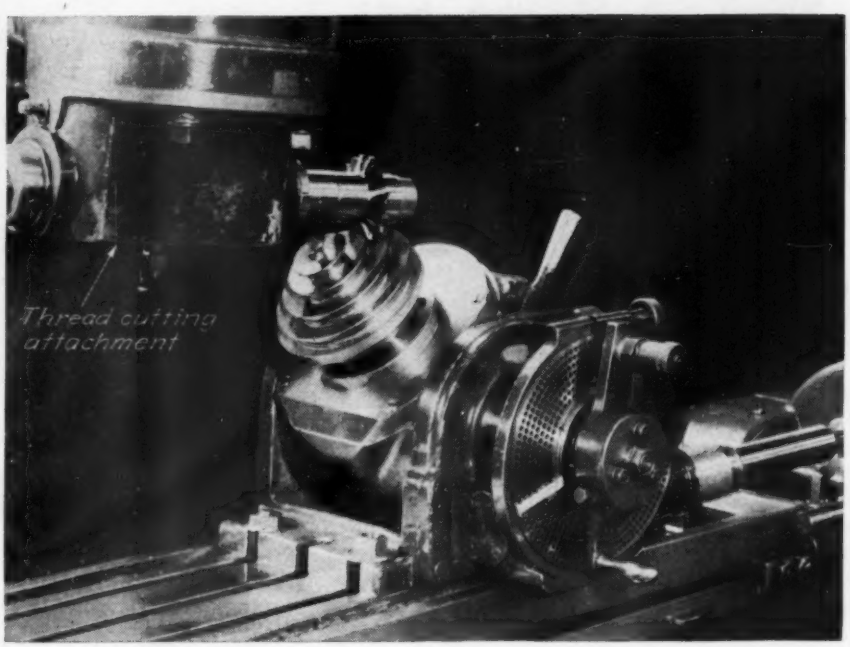


Plunger clamping nuts, used with the plunger screw shown in one of the other illustrations, has triple threads or 0.333 in. pitch which provide the 1 in. lead. The thread is 0.135 in. deep and 0.129 in. wide at the base. Two nuts, one with left-hand threads and one with right-hand threads must be milled, and the threads on each must begin at exactly the same place. The nuts, finish machined except for the threads, are mounted on a plate the end pedestals of which are equipped with trunions that fit the dividing head and tailstock centers. The threads are cut with a form end mill ground to the shape of the threads and assembled in the spindle of a swivel-head vertical attachment. The relative positions of cutter and workpiece mounted on the fixture, as the latter turns between centers while cutting one thread, is shown in the illustrations. The gears selected to drive the dividing head whose spindle must rotate in correct ratio to the table travel to produce a pitch of 0.333 in. in a triple thread with a lead, therefore, of 1 in., are as follows: A = 25, B = 26, C = 37, D = 40, F = 8 and G = 24. Milling the worm threads to start exactly at the same place on each pair of nuts is effected by noting the starting position of the dividing head index plate for the first thread on the first nut, and then starting at the same position when beginning the threads on the mating nut. The three spacing collars shown on the dividing head trunion of the plate fixture are each 0.333 in. wide. In order to mill a triple thread, these spacing collars are removed successively after the milling of a thread.

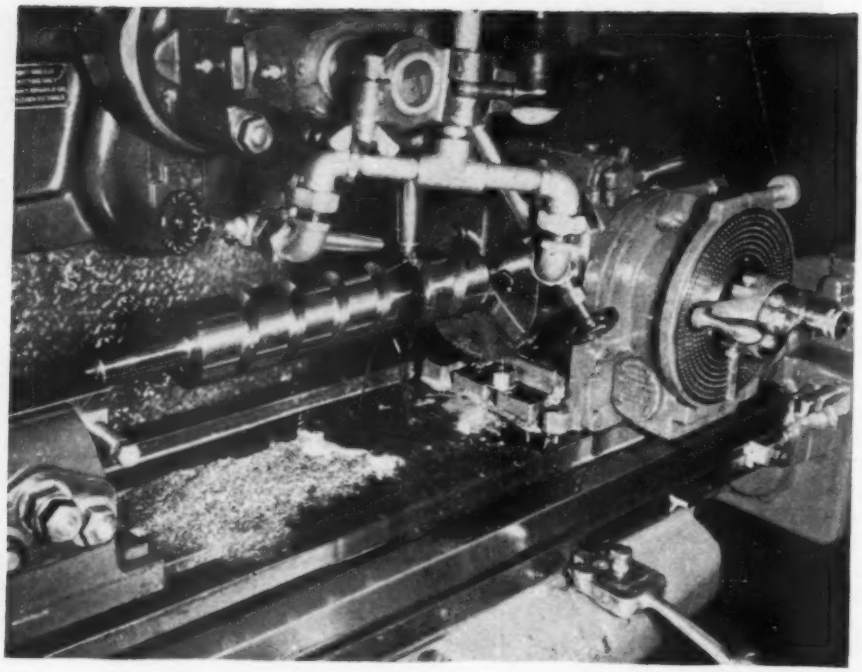
Plunger screws with their locking nuts must be machined to close tolerances since they determine the specified accuracy of 0.002 in. total error of the indexing table in which they are used. The screw shown here has left-hand and right-hand threads, which are 0.135 in. deep and 0.129 in. wide at the base. The pitch is 0.333 in., and since it is a triple thread, the lead is 1 in. The threads must start at equal distances from the center of the shaft. These threads can be cut on a universal miller equipped with thread milling, low lead attachments and a universal dividing head. The shaft is mounted between centers and must be supported by a steadyrest. The helix angle of 17¾ deg. of the threads is obtained by setting the table of the universal miller at that angle. A 2½ in. Acme cutter is mounted in the spindle of the attachment and run at 202 r.p.m. The feed rate is 2½ in. per min. for roughing and finishing cuts, one each of which are taken. Gears interposed between the table leadscrew and the dividing head to produce the 1 in. lead have the following number of teeth: A = 20, B = 28, C = 21, D = 40, F = 8 and G = 24. When starting the right-hand thread at the center of the shaft, the position of the dividing head index plate must be noted. It is set at exactly the same position when starting the left-hand threads, thereby starting each thread at equal distances from the center of the shaft

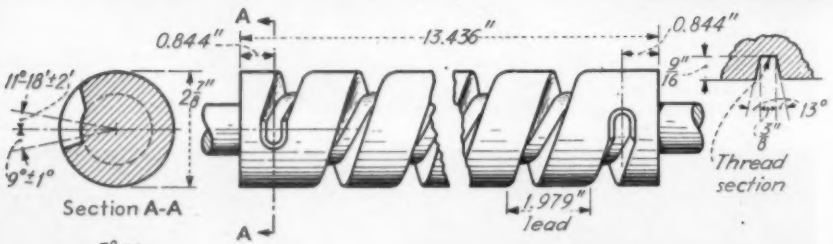




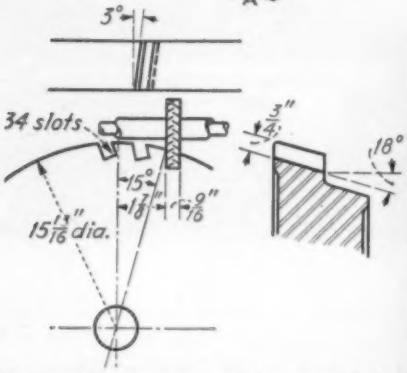


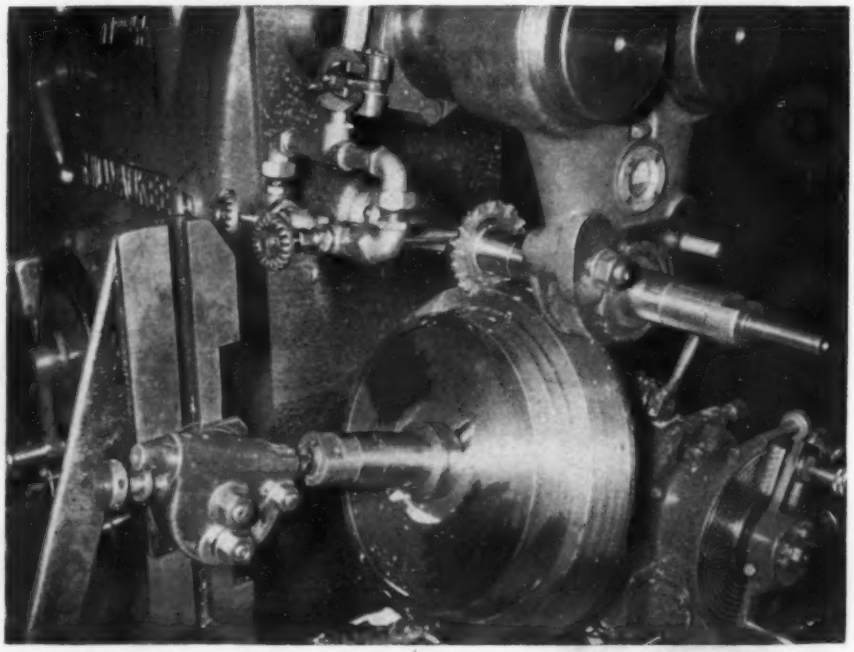
Spiral grooves must be first milled in oil-well drilling bits so that radial slots can be cut to form teeth. A spiral dividing head is necessarily used for this operation, first, to provide the proper angular relationship between the workpiece and cutter, and, second, to drive its spindle in proper relation to the table feed. This relation is established by the lead of the spiral, which in this case is ¾ in. Therefore, the table moves ¾ in. longitudinally while the workpiece is making one revolution. The gearing used to drive the dividing head for this lead is: A = 36, B = 20, C = 40, D = 32, F = 1 and G = 24. Experience has shown that the dividing head should be set at 45 deg., and the thread milling attachment at 5 deg. so that the drilling bit will have maximum life when cutting through rock.





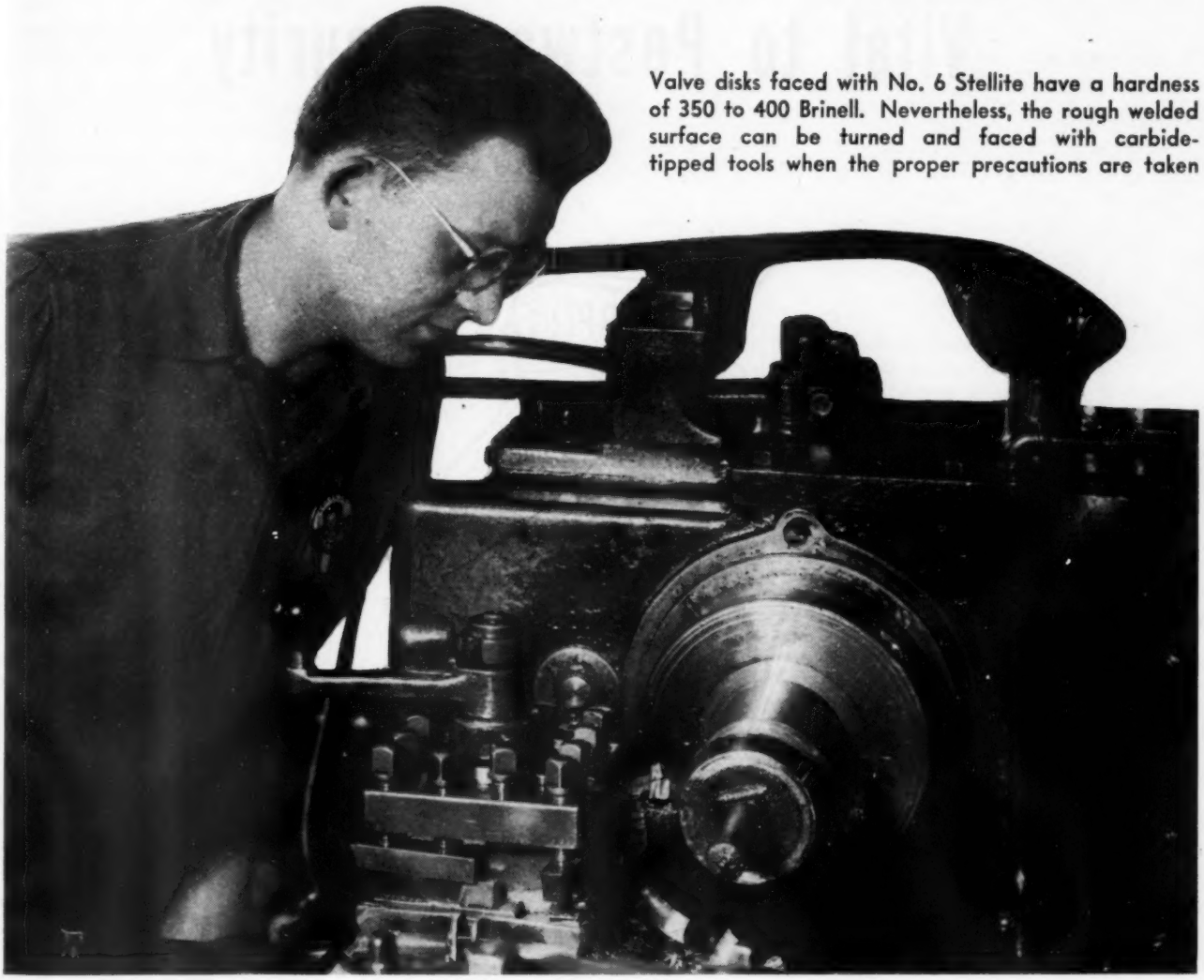
Feed cams can be cut on the milling machine with a form end mill assembled in a collet in a universal attachment. The workpiece is set-up between dividing head and tailstock centers and the end mill is aligned with the workpiece by means of a test bar. After positioning the cutter 0.884 in. from the left end of the shaft for the start of the cut, the dividing head spindle is rotated through an angle of 11 deg. 18 min., plus or minus 2 min., to establish the starting point of the cam track. The cam track is terminated in like manner, but with the end of the cam track at an angle of 9 deg., plus or minus 1 deg., with the center line of the shaft. The form end mill is ground 3/8 in. diameter at its end, with 13 deg. angles on each side, to produce the shape of the cam track. Gears selected to drive the spiral dividing head to produce the 1.979 in. lead are as follows: A = 25, B = 32, C = 38, D = 40, F = 8 and G = 24. A cutter speed of 302 r.p.m. was used, while the feed for roughing and finishing cuts was 3/8 in. per min. The finishing cut was 0.010 in. deep





Face-mill blanks can be slotted for the insertion of cutter blades, using the milling machine set-up shown here. The blank shown is for a 16 in. diameter face mill having 34 slots, 3/4 in. deep and 9/16 in. wide. The cutter blank set on an arbor is held in the spindle of a universal dividing head tilted to 18 deg., the arbor being supported by a tailstock that can be tilted to accommodate the angular setting of the cutter blank. A staggered-tooth 4-in. cutter is mounted on the machine arbor for conventional milling; thus, the cutting forces are downward, and there is less danger of damage to the workpiece and cutter. The 4-in. cutter for milling the slots is offset 1 7/8 in. from the center of the face-mill blank, or at an angle of 15 deg. from the center line of the face-mill blank. In addition, the dividing head and tailstock are set at an angle of 3 deg. from the longitudinal axis of the table in order to mill the straight slots at 3 deg. as shown in the drawing. During the milling operation, the face-mill blank is fed vertically into the cutter a distance of 3/4 in. The milling of each successive slot requires that the table be lowered, and the dividing head indexed properly for each of the 34 teeth. When using a dividing head with a 5:1 ratio, each slot is indexed by turning the crank through 10 holes on a 68 hole circle

Turning Stellite With Carbides



Valve disks faced with No. 6 Stellite have a hardness of 350 to 400 Brinell. Nevertheless, the rough welded surface can be turned and faced with carbide-tipped tools when the proper precautions are taken

COMMON PRACTICE is to grind No. 6 Stellite hard facings from the rough, but the Crane Company has developed procedures for rough turning the weld deposit on valve disks and counterboring valve seats. A small amount of stock is left for finish grinding. This combination of methods reduces manufacturing costs.

Tools are tipped with the steel-cutting cemented carbides. For turning operations the tools are ground with zero side and back rake angles, and with a minimum of front and side relief angles. Normally, a relief angle of 4 deg. is sufficient. In setting up the tool for turning or facing operations, care is taken to set the cutting edge 1/64 to 1/32 in. above center.

When turning cylindrical or conical surfaces from the rough, plunge cuts have been found best. Width of the cutting tool is slightly greater than the width of the surface to be turned. When facing across a flat surface, a regular facing cut is taken. No attempt is made to take a plunge cut parallel to the axis of the work. Hand feed is employed, since the feed must be extremely slow until after the rough, welded top surface is removed. A slow cutting speed of about 10 to 15 ft. per min. is best. No coolant is employed.

The chips crumble easily and the dust is very abrasive. For this reason, certain machines are reserved for turning operations. Working surfaces wear rapidly so these machines are not used for other operations where accuracy is required. Carriage bearings are protected with the best wipers obtainable, but the dust still works its way into the bearing surfaces.

An advantage of turning hard-faced valve disks is that poor welds show up soon after the rough top surface has been removed, and the disk can be sent back to the welding shop for repair.

Similar technique is employed for machining hard-faced valve seats. Counterbores for these Stellited surfaces have three flutes faced with carbide tips ground so that the cutting edges are radial, and have zero side and back rake angles. A 4-deg. clearance angle is ground back of the cutting edge. These tools are tipped with the grade of carbide employed for intermittent cuts in steel.

There is one difference between the turning and the counterboring operations; when counterboring, the work is flooded with sulphurized oil. Again, slow cutting speeds and fine hand feeds are in order. The operator must be careful of his tools until the cutting edges have removed the high spots left by the welder. When the rough surface has been removed, the feed can be increased materially.

Vigorous Machine Tool Industry Vital to Postwar Security

BY CHARLES A. SIMMONS, PRESIDENT, SIMMONS MACHINE TOOL CORPORATION

TOO FEW PEOPLE realize the basic importance of the machine tool in building a nation. It is really the mother of industry.

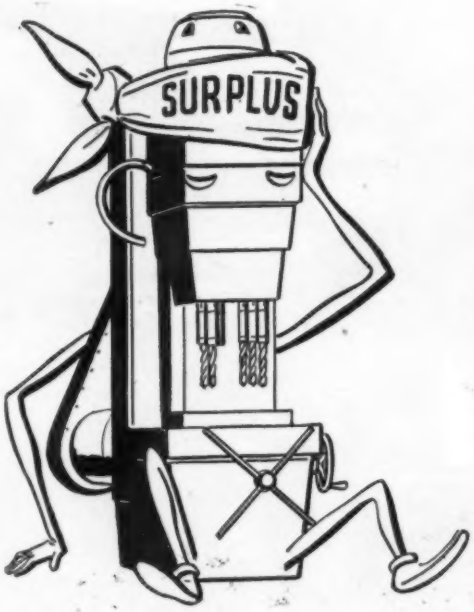
Choose any everyday necessity or luxury and at its source you will find the machine tool. Without machine tools no industry could have advanced from the primitive stage. Without them — and mark this well — America surely would not have become the Arsenal of Democracy, for on the cornerstone of the machine tool industry rest the six essentials of successful total war: agriculture, mineral extraction, construction, manufacturing, transportation and communication.

To appreciate the full significance of the above statements, I wish you could have taken the 15,000-mile trip through South America I have just completed. In Brazil, Argentina, Chile and other Latin American nations striving for industrialization, *vast natural resources and millions of willing hands are idle for want of machine tools.* Words cannot industrialize a nation. Machine tools can.

Today this industry, the first to leap to the aid of a war-stricken world, expanding itself out of all belief in the process, faces the threat of virtual extinction. Taken for granted except in time of war, never big in dollar volume, its inner workings known to only a comparative few, the machine tool industry faces the growing danger that after the war it will again be forgotten. This would be a catastrophe as great as the one which was so barely averted in the years between 1939 and the present day.

Today the nation as a whole is beginning to talk and plan for the postwar period. Already some industries are asking government aid.

All that the machine tool industry asks is *simple cooperation.*



THE PLAN

1. Permit only new machine tools and used tools over ten years old to be exported.

2. Dispose of all surplus government machinery at prices based on percentage of original cost of standard new machine with standard accessories.

3. Create an independent government department to dispose of all machinery regardless of the branch of service having ownership.

4. Control the sale of second-hand and rebuilt machinery.

5. Provide a means of financing export business.

Why? Because after the war there will be a surplus of machine tools in this country such as the world has never seen. You may well ask, "But won't there also be a surplus of a lot of other products produced for war?"

True, except that a machine tool is not expendable. A machine tool can produce other things besides implements of war. A machine tool is built with a life expectancy, at a minimum, of twenty years. Unless this surplus is properly handled, unless really workable plans are formulated *now* for the proper handling of this surplus, this vital industry can be slowly and surely wrecked. Just as this nation could not have grown to greatness without the machine tool industry, so can it be wrecked by the thoughtless extinction of this industry.

In the first place, we realize now that we must be ready for war at all times, if not with a standing Army, Air Force or Navy, at least with a standing potentiality which can be the means of creating implements for protection. Secondly, an army without a healthy internal status is only half the means of protection. In other words, business must flourish, too.

Foreign nations and interests are already preparing for harvesting the machine tool surplus. If our government should allow this surplus of modern machine tools to be sold for export at sacrifice prices, it would be little short of national sabotage. For years American business economists have urged that industry eliminate machines over ten years old. There will be a surplus of some 400,000 machine tools and, these, by a systematic Government decree, should fall into the hands of American industry. Machine tools over ten years of age can thus be released and sold for export, or perhaps be scrapped.

In the course of my trip through South America, I made the first approach at surveying the potential market for American machine tools abroad. I believe that the simple cooperation mentioned can be achieved by a series of direct regulations, the most fundamental of which are the following:

I. Permit only new machine tools and used machine tools over ten years old to be exported. This will:

(a) Give the manufacturer an opportunity to participate in export business;

(b) Give him the opportunity to complete unfinished machines he is certain to have on hand when the emergency is over. It will enable him to use up his inventory in keeping his organization together, thus reducing the unemployment which is bound to follow immediately upon war's end;

(c) Enable the Defense Plants Corporation to sell, without serious loss, the enormous surplus of new machines which it is now accumulating;

(d) Enable the manufacturer, should he so choose, to buy up and rebuild tools of his own make which are over ten years old. He will be assured of a definite market for them;

(e) Entirely eliminate the speculator from buying up late-type tools, as no export market would be available and he could do nothing with them except barter;

(f) Compel all foreign purchasers and private companies who contemplate establishing branches in other countries to place orders for new machines or for machines that are over ten years old, and

(g) Enable America to revitalize its industrial machine. Otherwise, we will be providing foreign nations with the latest and best production means at a song, which, coupled with cheap labor, would give them a superior competitive position.

II. Dispose of all surplus government machinery at prices based on a percentage of original cost of standard new machines with standard accessories. By this method:

(a) Every branch of American industry equipped with old-type machine tools can immediately purchase newer machines at reasonable prices and dispose of their older ones. Thus they can be equipped immediately to take care of postwar competition;

(b) All of the late-type machine tools would remain in the hands of American manufacturers. Should the need ever arise again, we would be equipped to make implements of war in the shortest possible time. In 1939 American industry's machine tool equipment had deteriorated to the obsolescent state, a dangerous condition for a nation such as ours;

(c) American industry can dispose of its older machines at prices that would go a long way toward paying for late-type machines. Obsolete machines, or those over 25 years of age, for which there would be no possible sale here or abroad could be scrapped. Thus, it would immediately provide a tremendous source for eliminating the surplus. Also, it would provide a potential market in a short time for the sale of new machine tools in this country;

(d) By disposing of the government surplus of machines at 20 percent of the price of a new standard machine, the price will be higher than already provided for in numerous government contracts, where users have the right to purchase such old equipment;

(e) More will be realized from the sale of this machinery than if sold by conventional government bids. Anyone who purchased or had experience with bid-in machine tools after the last war definitely knows that in most cases such equipment was sold for little more than junk after considerable handling and storage expense;

(f) It will make possible setting aside, by the government, of special plants and machinery to be preserved for emergency — the same as arsenals do in peace time;

(g) All jigs, fixtures, small tools and the like used on standard machine tools, employed in making implements of war, should be properly marked and placed in government storage for use should the occasion arise. This would eliminate in large measure the bottleneck of small tools, jigs and fixtures that preceded the present emergency;

(h) All machine tools over ten years of age released by industry would

immediately fall into the hands of a competent rebuilder or manufacturer who desires to rebuild his own tools. An immediate foreign market, especially in South America, is waiting, provided that machines can be sold at a price of approximately 50 percent of the present-day new price for a similar machine. These were the tools which made this nation the greatest, production-wise, in the world, so that foreign interests should be willing to purchase them provided the price is such as not to prohibit their sale.

III. Create an independent government department to dispose of all machinery, regardless of the branch of service having ownership. By this procedure:

(a) All machine tools owned or controlled by the government would be turned over to a sales department and sold in much the same manner that industry gives merchandise to a seller on consignment;

(b) There will be only one source from which all purchases can be made. After a deal is consummated, funds can be turned over to the particular service to which the machine belonged. Sales expense will be reduced to a minimum and red tape in the disposition of such equipment will disappear;

(c) Industry will be able to purchase its equipment and get started immediately and eliminate the unemployment that is bound to follow, especially in the changeover period.

In disposing of such equipment a simple procedure can be followed. An actual photograph of all surplus government equipment would be required in 8x10-in. size, showing standard parts and accessories that belong to the machine but eliminating jigs, fixtures and special attachments. Attached to this photograph would be a complete description of the machine and all of the government references as to the contract and service. Three copies of this material would be required; one to be retained, one to be sent to the department or service to which the machine belongs and the third to the government sales department. This form can be a typewritten form which, in order to get into the hands of all holders of surplus machinery immediately, can be printed in the different machinery publications. Those needing such forms can make a reprint at little or no expense and in this way eliminate every possible delay in completing negotiations.

By photographing the machine and the parts that go with it, the holder of the machine will be morally compelled to care for it properly, and the purchaser will definitely know just what he is to receive. The greater portion of such equipment can be sold from the photograph, thus avoiding the tremendous time delay which otherwise results.

Inasmuch as a greater portion of the machines under ten years of age will be possibly less than five years of age and should be sold at 20 percent of the new price, there is still a possibility that machines between five and ten years old can be sold at a somewhat lower price.

Unless immediate steps are taken *now* to provide for the disposition of such machinery, at the time of the changeover machinery will be placed in undesirable storage and exposed to the destructive elements of weather. The disposition will then be more difficult as sales values would decrease.

IV. Control the scale of second-hand and rebuilt machinery.

In the past there has been no control whatsoever over the sale of second-hand and rebuilt machines; foreign purchasers have suffered in a great many instances. Unless controlled, such sales would affect the smooth disposition of the surplus machines.

This can be remedied by compelling a rebuilder to register with the State Department. When foreign purchasers seek machinery, the State Department can furnish a list of registered firms who fulfill their guarantees and provide the customer with what he expects. Should foreigners buy from non-registered firms, they would be doing so on their own responsibility and could not look to the department for any redress.

If there is to be control exercised on the sale of used machine tools only, two different classifications are necessary. First, machine tools that are sold "as is," in which case the buyer assumes all the responsibility. Secondly, machine tools that are sold "rebuilt and guaranteed." These should carry the rebuilder's guarantee of the original manufacturer as to tolerances. All worn parts that affect the operation of the machine are to be renewed, the machine tested under power and a test sheet showing the tolerances provided, the same as the manufacturer provides with a new machine. The purchaser or his appointed representative or inspector should have the right to inspect the machine under power before shipment.

V. Provide some means of financing export business.

For some time after the war, especially in South America, it will not be necessary to finance export business. There industry is waiting impatiently for the opportunity to purchase American machine tools and has ample cash available as the result of favorable wartime trade balances. But when the time comes for foreign competition again to enter this market, we must be in a position to transact business without the financial red tape usually encountered. Possibly this could be worked through the Export-Import Bank, whereby the seller would get his bank to handle the transaction. This bank, in turn, would hold a chattel on the equipment and discount the note with the Export-Import Bank. This would give the purchaser the necessary time.

Now that there is a large surplus of American machine tools, both new and used, steps should be immediately taken to release them to South American countries. These would be paid for direct by industry and not by Lend-Lease. In this way we would start the movement of surplus machinery and implement the Good Neighbor policy, with actions speaking louder than words.

After the last war we "missed the boat" on South American machine tool business for several reasons:

1. We did not speak their language.
2. We did not give them the proper technical and practical help.
3. We did not deal direct, which necessarily increased our already high prices.
4. We failed to take such export business seriously.

Unless we work along proper lines, we are bound to miss the boat again.

Free Enterprise

WHAT IS IT? HOW DOES IT WORK?

☆

OURS is a free-enterprise economy the chief motivating forces of which are the prospective rewards for effort and risk-taking. Its smooth operation depends: first, on adequate incentives for risk-taking, innovation, and individual effort; and second, on sufficient competition to minimize the need for government regulation and to prevent artificially high prices or wages from being maintained in large segments of the economy. Trouble comes when these incentives and this competition are tampered with or removed.

America was founded by men who had the urge to better themselves and the courage to take a chance. These men uprooted themselves in Europe and braved the unknown. They risked all for freedom. They knew that, to be free, they had to attain economic freedom. Their goal was an economic freedom which permits the private ownership of property, the free choice of jobs, and free entry into entrepreneurial pursuits. Their efforts, therefore, were directed toward individual opportunity with no limit on individual achievement. Their foresight and the endeavors of those who followed them created the world's greatest industrial nation enjoying the highest standards of living.

We can take pride in the knowledge that our country has been the greatest single contributor to the world's physical assets even though we remember that an abundance of natural resources contributed materially to America's economic development. But the fact that our progress has been interrupted, again and again, by depressions which resulted in enormous wastes of our human and material resources is sobering proof that our economic mechanism still is far from perfect.

Our production per man-hour has been increasing at the rate of 2½% per year. Improved machines and greater efficiency have more than tripled the output per hour of work since 1900. Looking to the future, this annual rise indicates that our production per hour of work will double in the course of the next 25 to 30 years. This means that we can have twice our present volume of goods and services per capita or an equivalent combination of more production and more leisure. In other words, we can further increase the living standards and further decrease the working hours of the American people by further intensifying our industrial efficiency.

This is no idle dream. It can be achieved, and it will be achieved, if only we maintain the essential features of our system of individual enterprise which alone makes possible this near-utopian goal. Intensification of our efficiency, however, means that we can have full employment only if we expand enormously our production, and particularly our production of new goods. We can expand total production only if we have the markets and the demands for the vast output of goods and services made possible by our technological development. To attain these, we will need to venture into new markets, new inventions, and new methods. Such ventures involve risks, and risks will be taken only if there is sufficient prospect of reward.

Let us never lose sight of the fact that the essential features of free enterprise are the prospective rewards for risk-taking as well as for effort.

The evidence is clear that incentive methods of wage payments will boost production. Carefully devised systems of salary payment with large differential inducements for superior performance have been powerful means of raising the standards of managerial accomplishment.

Free enterprise cannot operate effectively unless the wage and salary system offers greater rewards for greater effort. Neither can it operate effectively unless the prospects for profit are sufficient to encourage the employment of resources which otherwise would be kept idle.

Unless the prospects of profit are superior to the prospects of loss, new ventures will not be undertaken and going concerns will not expand or continue long in business. When the hope for profits wanes, employment and production slump; when that hope revives, employment and production recover.

Business initiative must be given every possible in-

ducement in order that maximum employment may be achieved through private enterprise. This involves the removal and avoidance of restrictions on business by government, by labor, and by business itself.

Competition is the life-blood of the free enterprise system. Business and industry must rely upon efficiency rather than upon protection from competition for their survival.

Those government controls which were made necessary during the war by the magnitude of government demands for goods should be lifted at the earliest possible moment. As soon as the danger of inflation has receded, price controls must be removed and profit margins again left free to be determined by market forces. The excess profits tax must be repealed and the burden of other taxes on business profits greatly reduced. Tax laws should be revised so as to permit adequate rewards for assuming risks. The modernizing of anti-trust laws and their vigorous enforcement, not indiscriminate persecution, will be supported by all who really want free enterprise. Such measures will strengthen the incentives to expand old businesses and to start new ventures.

Grants of unlimited monopoly powers to labor unions which enable them, consciously or not, to sabotage the profit incentive in business must be withdrawn. Labor has certain legitimate rights; and in order to preserve them and its freedom, labor must come to realize that its best interests lie in a well functioning, self-disciplined competitive free-enterprise economy.

There must be evolved in the minds of business, labor, and the public a recognition of the need for private business enterprise and a realization that policies which throttle it are harmful not only to businessmen but to workers and consumers as well. Unless we achieve this understanding and avoid needless deterrents to business expansion, we are likely to pay for our folly in the destruction of our free enterprise system.

We cannot tolerate conditions in which special interest groups in business, labor, agriculture, or politics prevent free access to the market by would-be competitors. Such monopolizing of opportunities stifles progress and creates profits or wage rates based on artificial scarcity. In such cases government interference to open the market to all comers is clearly indicated. We must recognize the need for constructive policies by business, labor, and government which will insure the competition necessary for the successful operation of our economy.

Increased government regulation and control of business activities is not conducive to strengthening the virility of private enterprise. Government ownership and operation of productive resources certainly is not to be condoned. The more government rules and regulates business, the less will be the incentive to assume risks and to exercise individual initiative. Government regulation of the detailed operation of industry inhibits progress, is prey to political pressures, and is subject to the human failings of its administrators. *Better far the rough guidance and justice of vigorous, though somewhat imperfect, competition than the uncertainty of arbitrary regulation.*

The gravest threats to our competitive system exist in legalized monopolies, such as the N.R.A. once comprised, such as the labor unions and farm groups have recently achieved, such as businessmen themselves have sometimes sought. The power of labor monopolies to encroach on business profits will tend to interfere seriously with the needed flow of new investment. And when any group is strong enough to move the average level of costs as much as the labor groups and the farm groups are able to do, there is good reason to fear that, when we begin to approach high levels of employment and production in time of peace, these groups will induce a price-wage spiral which will waste money incomes on price increases instead of permitting them to draw unemployed resources into production. While the demands of labor for collective bargaining rights and the demands of farmers for protection against the rigors of depression have validity, there can be no reason for excessive grants of power and privilege which threaten to make our system of free enterprise unworkable.

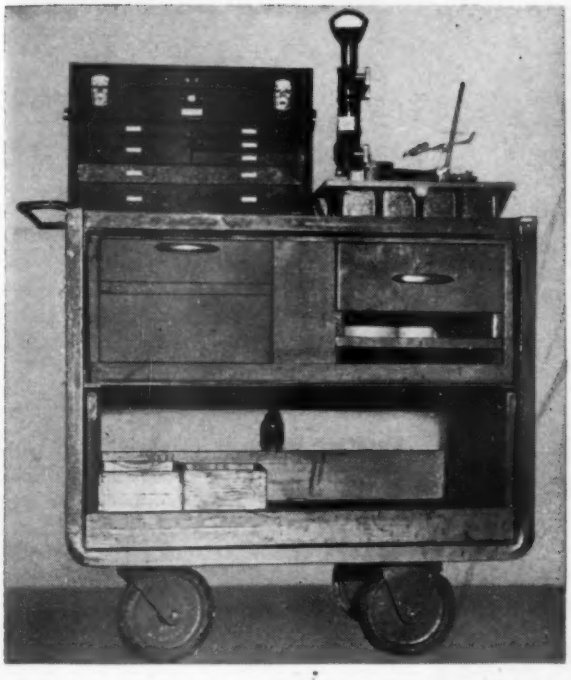
Ours is a complex economic structure. The functions which prices, income, savings, investments, and taxes play in this system are difficult to comprehend.

As I have said before: Thinking is hard work, and we will have to work hard if we are to develop business policies, labor policies, and government policies which will insure full employment and the opportunity for consistent profit. Yet only through such policies can we guarantee that private enterprise will be the predominant source of jobs, income, and production.

Even more difficult than thinking, and more important, is the implementation of many policies that are in the interest of the free enterprise system. Not all measures will satisfy all people. Special interests will have to be subordinated to the total interests of the nation. Sacrifice and vision have been essential to the winning of the war. They will be no less essential to the winning of the peace.

If we can gain recognition of the crucial role of incentives for enterprise, if we stand squarely for competition and against protection or privilege for special interests, and if we bend our efforts to find satisfactory ways and means to prevent large-scale unemployment, we can have the full benefits which only a free enterprise system can produce—in industrial progress, in improved standards of living, and in the preservation of our democratic ways of life.

President, McGraw-Hill Publishing Company, Inc.



Portable carts, equipped with inspection devices, tour the plant constantly to check gages at the scene of the operation on which they are used

Chances of faulty gages remaining on the job for any length of time are eliminated by periodic inspection during each shift, thus materially reducing the possibility of final parts rejection

Portable Carts for Gage Inspection

BY GERALD E. STEDMAN

FAULTS inherent in the usual system of factory gage control have been overcome by the N. A. Woodworth Company which recently instituted a plan based on the use of a number of portable gage inspection carts. In most plants, gages are drawn from the gage crib at the start of a shift and returned there when the shift ends and usually serve the entire shift without any accuracy check. For some types of production this is all right, but it did not suit Woodworth requirements.

Now approved gages are issued for operations on which they are used and remain on those operations as long as they are fit for use. The practice of issuing and turning in gages as the shifts change has been entirely eliminated. The portable carts, each of which is assigned a group of operations, tour the plant and when a gage is found to be unfit for further use it is replaced and returned to the gage crib for repair or disposal.

Equipment on each cart consists of all records and instruments needed to complete its functions within the assigned area. Carried on the top of the cart are a surface plate, surface gage, Swedish reference gage and the inspector's tool box. There are several drawers, one of which contains a master gage block set, parallel bars, V blocks and thread wires. Another holds master plug gages and the third carries records covering each gage to be inspected. Each record shows gage number, wear limits, latest engineering changes, gage life, operations on which used and inspection record. Other equipment on the cart includes a set of micrometers and a limited inventory of approved gages to replace those found to be worn.

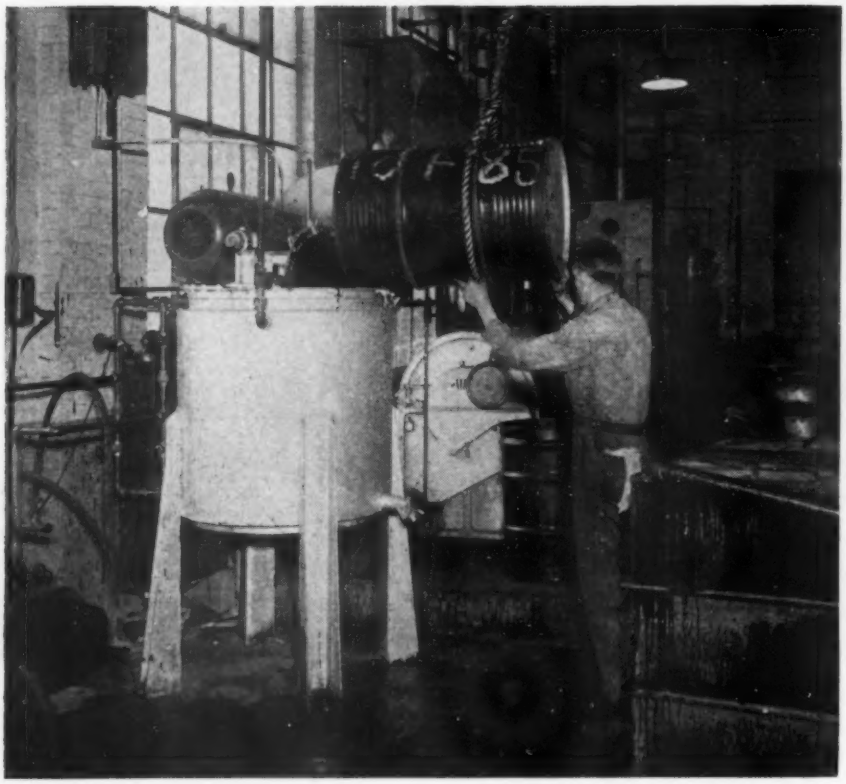
Routes and schedules through the plant have been carefully prepared to cover each gage at least once each shift. Where required, on close-limit gages, more frequent inspection is provided. Much of the process inspection in the Woodworth plant is at the machine and in some cases production is such as to inflict unusual wear hazards on close-tolerance gages. Inspection delay resulting from the usual gage control system does not supply required accuracy and exposes production to the risk of excessive rejection. Such a delay is eliminated by this new plan.

Inspector Establishes Time Control

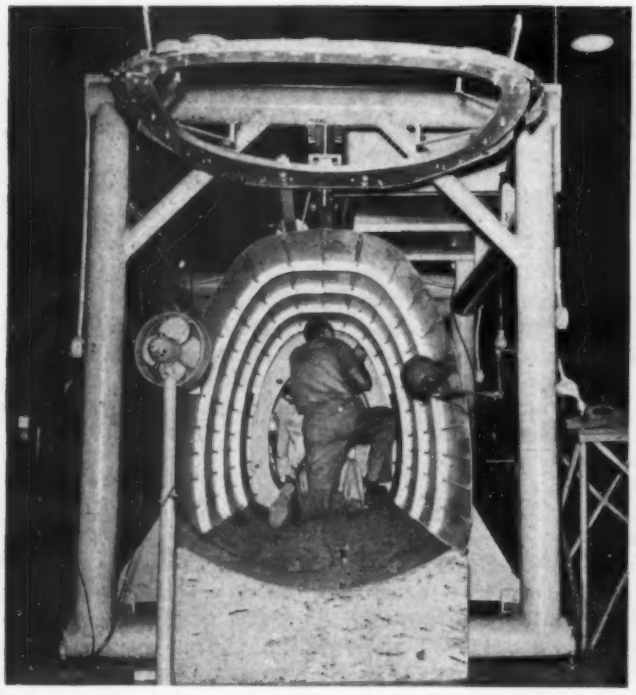
The gage cart inspector familiarizes himself with all of the gages to be covered and establishes a routing sequence and time control which makes possible special checks on those gages approaching wear limits. This is done so that they may be exchanged without delay and without discarding any unused wear.

Results of the cart inspection system include: reduced loss of productive hours checking gages in and out of the crib; eliminated rush periods which taxed the gage crib's capacity; lowered required gage inventories; reduced parts spoilage through better gage control; established gage control on the job, and, provided additional supervision of gage handling.

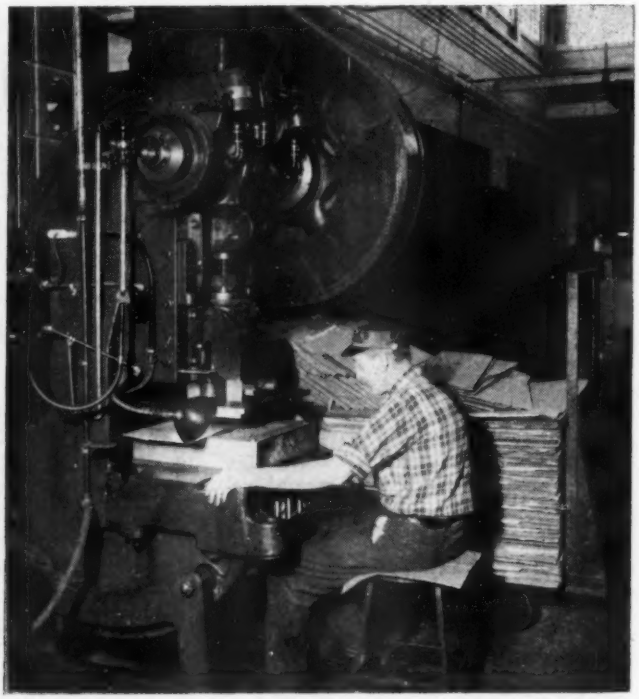
SHOP SHOTS



Reclamation of paint is done with this equipment in one of New England's large manufacturing plants. Paint sludge is mixed with equal parts of naphtha and strained through cheese cloth into a tank. It is then passed through extremely fine mesh screens and allowed to settle in drums. New paint is mixed with this processed sludge in the ratio of two to one. Dirty naphtha is cleaned by distillation in a solvent still. Westinghouse Electric & Manufacturing Company.



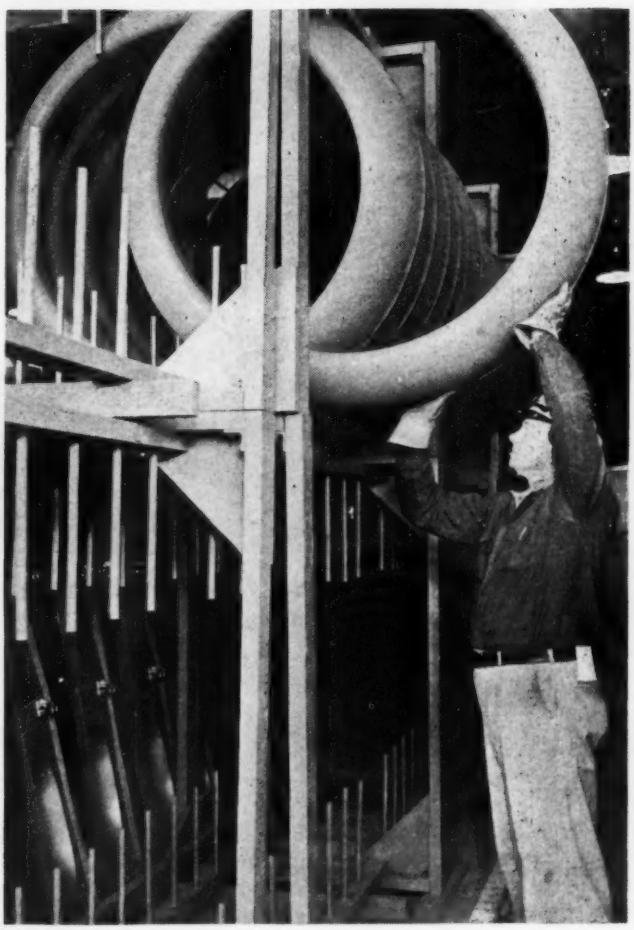
A number of operations must be performed inside the rear monocoque assembly of the *Vengeance* dive bomber before it is joined to the main fuselage section. The illustrated jig supports the rear monocoque subassembly in a horizontal position for these operations. Ample facilities are provided for lighting and circulating cooling air through the subassembly while workmen fit bulkhead rings, stringers, the skin, and accessories. A plywood floor protects the bottom of the subassembly from damage and provides a comfortable working position for the mechanics. Nashville Division, Vultee Aircraft Corporation.



Thousands of corrugated paper boxes and flat packing strips are used in shipping material to and from manufacturing plants. One New England manufacturer salvages these boxes by using them for storing material or by cutting them to required size and shape for packing strips in shipping boxes, for shelves in tote pans, or for protection pads when stacking finish machined parts on work benches. These are but a few of the 50 items made from the scrap boxes, which are cut to various sizes on paper shears and then blanked out on a punch press fitted with dinking dies. Westinghouse Electric & Manufacturing Company.

Work-simplification studies in the electrical department have resulted in this control-box production set-up. Holes are punched in the walls of each box for assembly of conduit and cables. Under the old set-up, one operation was performed at a time on each box, each of which was handled as many times as there were operations. To reduce this handling time, a circular work bench was built and clamps provided to support pneumatic pedal-operated tools in the positions shown. Interchangeable punch and die units or rivet sets are mounted in these tools. The operator carries each box successively to the various work heads so as to complete the box in one handling. Nashville Division, Vultee Aircraft, Incorporated.

An estimated saving of more than 1,000 man-hours daily is resulting in this plant through the use of trucks which carry gage-checking equipment to work locations in the production and inspection departments. This makes it unnecessary for workers to take their gages to a central checking station at regular intervals. Each truck carries a Swedish gage amplifier, a dial indicator, a surface plate, one set of master gage blocks, one set of depth micrometers, two sets of parallels, two set-up test bars, a height gage, one set of 1 in. to 12 in. micrometers, and miscellaneous accessories such as steel rules, V-blocks, hones, sealing wax and an alcohol torch. This plant has over 35,000 gages of 5,400 varieties. It is estimated that 7,000 gages are checked daily on the trucks. Nash-Kelvinator Corporation.



Long racks in this parts warehouse keep the engine-nose cowls of Hudson bombers out of harm's way until they are needed on the assembly line. The racks are made of 2×4-in. timber fitted at the corners with steel angle brackets and plywood gussets. Horizontal stays also made of 2×4-in. wood are fitted with 1 in. round pegs 18 in. long which serve as spacers for the cowls. The racks are fitted with removable casters, which are taken off when the racks are stacked on top of each other to conserve space in the warehouse. Lockheed Aircraft Corporation.

Fixture Permits Broaching in Crank Press

Broaching brass gate valve disks is handled efficiently with this horizontal fixture. Interchangeable work holders permit broaching 27 different disks without removing the fixture from the machine. The air line shown above the fixture keeps the work holder free of chips

When broaching with a crank press, Crane Company uses a special horizontal fixture to give more broach travel

SIMPLE SURFACE BROACHING operations frequently can be performed in crank presses. Where the broach is fitted directly to the ram of the press, the length broach which can be used is limited by the ram stroke. By applying a horizontal broaching fixture of the type shown, it is possible to perform broaching operations requiring a broach travel equal to two or three times the stroke of the ram.

The fixture was developed for broaching guide slots in each side of brass gate valve disks in sizes ranging from $\frac{3}{8}$ to 2 in. The fixture is mounted on a No. 6 Bliss inclinable crank press having a $3\frac{1}{2}$-in. ram stroke and 3-in. ram adjustment. It is geared to provide an 8 15/16-in. stroke of the broach slides and a $\frac{7}{8}$-in. throw of the knockout pin to eject the work piece from the holder on the return stroke of the ram. It is adapted to other surface broaching operations by using properly designed work holders and broach sections.

The principal parts of this broaching fixture are shown in the accompanying assembly drawing. The ram extension extends through a bolster plate, and carries a rack insert engaging a pinion. Constant engagement between rack insert and pinion is kept by a back-up roller.

The pinion is driven by a ram extension cut on a shaft, on which two gears *A* are fitted, one on either side. The two gears engage with rack inserts *B*. The slides *C* carry broach sections *D* which are advanced toward the work when the ram descends.

Between the two slides is a stationary work holder *E*. It is keyed and bolted to the bolster plate so that its position is held accurately. Between

the work holder and the ram and positioned between the two broach slides is an air cylinder *F*. The piston extension of the cylinder has a taper bore to fit a tapered extension on the clamp plate *G* which, like the work holder, must be changed for each different work piece. The piston extension *H* has an elongated slot at the bottom of the tapered bore so that a drift can be inserted for driving out the clamp *G*.

The right-hand broach slide carries a trip arm which operates a double-acting air control valve. When the slide starts to move forward air is admitted to the cylinder and the clamp is moved forward to locate and clamp the work piece. Upward movement of the ram again trips valve *I* to return the piston of cylinder *F*, release the clamp and withdraw it from over the clearance slot in the bolster plate just in front of the work holder.

As slides *C* are brought forward for the broaching stroke, the knockout slide is carried out to uncover the detent in the slide bar. When the detent is uncovered, spring pressure causes it to rise sufficiently so that when slide *J* is returned by the return movement of slides *C*, the detent is struck by slide *J*. The knockout slide bar is carried forward until the detent is pushed down below the bottom of slide *J* by a chamfer under the fixed plate in front of the slide. As the knockout slide bar is carried forward it actuates the knockout pin in the stationary work holder. This pin has a forward motion of 7/8 in., sufficient to force the work piece to drop out of the holder and into a tote pan below the press.

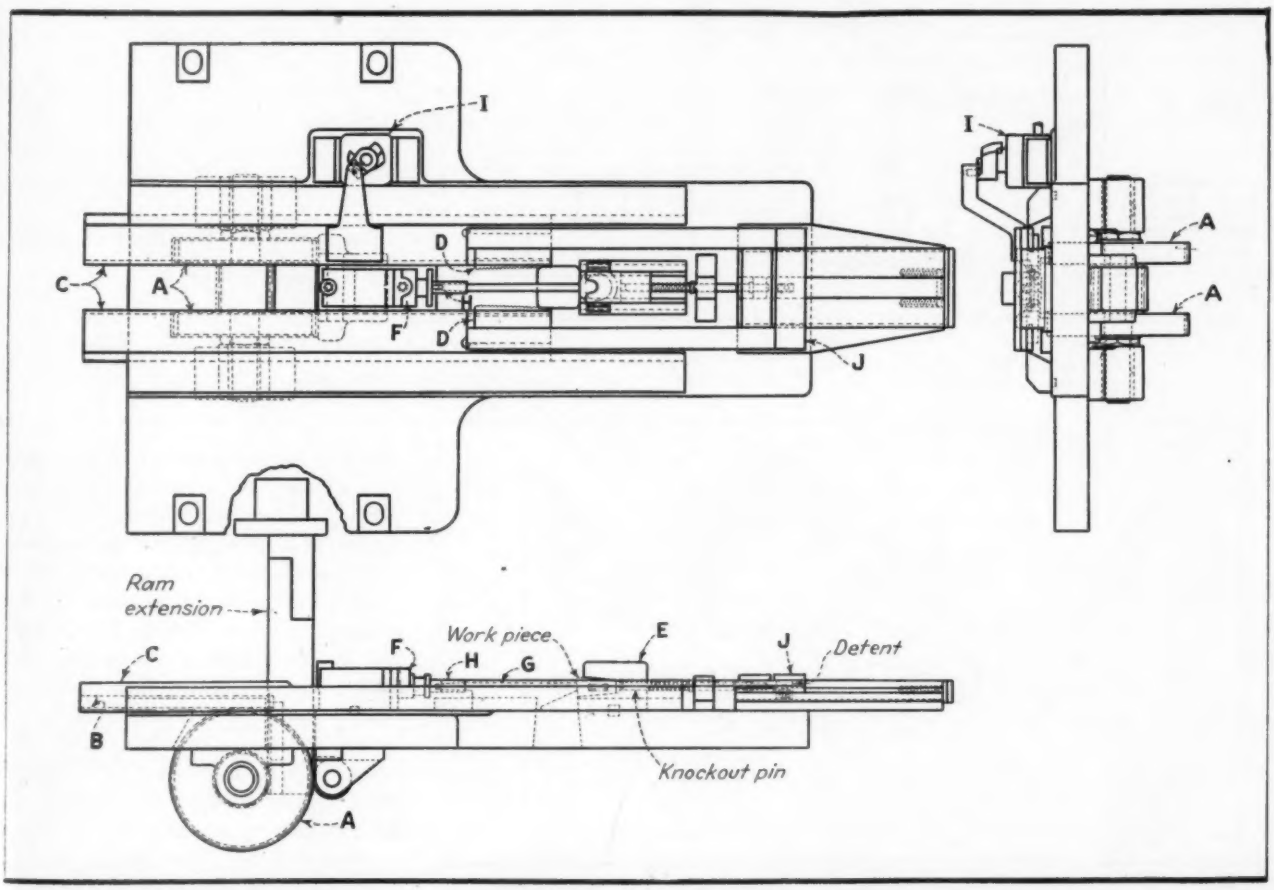
Low Press Down Time

Springs in the slide base are compressed and return the knockout slide bar as soon as the detent is forced below the bottom of slide *J*. A rubber pad absorbs the shock of the return of this bar. The knockout pin is returned to position when the knockout slide bar returns to its original position.

By designing the fixture so that the knockout pin is operated automatically during the return stroke of the ram, press down time has been reduced to the minimum necessary for loading the piece and then operating the two air valves which control the press clutch. Two operating valves, both of which must be used at the same time, are employed to insure that the operator's hands will be safely out of danger before the ram starts its down stroke.

The guide slots now being broached in brass gate valve disks range from about 1/8 to 1/4 in. wide, and they usually are of approximately square cross-section. One slot is broached in each side of the disk. Usually, one of the two slots is slightly larger than the other, so as to insure that the disk can be assembled in the valve in only one way. The tapered disk is centered by the top and bottom jaws of the stationary work holder. The broach sections used for cutting these slots are about 5 in. long and are made of high-speed steel heat-treated to a hardness of 62-64 Rockwell C.

The press normally is operated at a speed of about 8 to 10 cycles per minute. This allows ample time between working strokes for the operator to locate the work in the holder, and for the knockout mechanism to operate. To make the job as easy as possible for the women operators of this press, the work is delivered at fixture height from a bin alongside the press. Finished pieces drop into a pan under the press and when full, this pan is taken away by a moveman.



A broaching stroke of 8-15/16 in. is achieved with a ram stroke of only 3¼ in. by the gearing incorporated in this horizontal broaching fixture. No changes in the press were necessary in order to mount this fixture

Ideas From Practical Men

Dressing Grinding Wheels With Tangent Radii

By LESTER J. LA LIME

It is often necessary to grind a form having two tangent radii such as the end of the punch shown in Fig. 1. The problem is to true the grinding wheel to the correct contour without having a break in the form at the point of tangency of the two radii. This can be accomplished only by truing the grinding wheel with one continuous sweep of the diamond. A truing attachment that will do this is shown in Figs. 2 and 3.

The diamond tool is mounted in swivel holder *A*, and the diamond is set to a 0.3 in. radius from pivot *B* by a diamond setting gage. This swivel holder is mounted in auxiliary swivel bracket *C* which pivots on pin *D*. The center distance between pivots *B* and *D* is 1.7 in. Thus, the distance between the diamond point and the second pivot is 2 in., which is the correct amonut for making the larger radius.

In Fig. 3 the diamond is shown at the point of tangency of the two radii with the angle face of locking pin *E* for the 0.3 in. radius holding swivel *A* against stop *F*—locking pin *E* and stop *F* are on auxiliary swivel bracket *B*. The angle face on locking pin *G* for the 2.0 in. radius holds auxiliary swivel bracket *C* against stop *H*—locking pin *G* and stop *H* are on the main base of the attachment.

When handle *J* is rotated clockwise from the position shown in Fig. 3, pivot *B* for the 0.3 in. radius is held rigidly in position by stop *F* and the spring pressure of locking pin *E*, while locking pin *G* is pushed back. Thus, auxiliary swivel bracket *C* leaves stop *H* and the 2.0 in. radius is formed. When the direction of handle *J* is reversed, bracket *C* returns through the same path until it contacts stop *H*. It is held rigidly in this position by the spring pressure of locking pin *G*. Further counterclockwise rotation of the handle causes locking pin *E* to be pushed back, swivel holder *A* leaves stop *F*, and the 0.3 in. radius is formed. Thus, continuous rotation of handle *J* automatically changes the position of the pivoting center, and the full form is produced in a continuous sweep. This truing attachment can be made for any combination of two radii that must be dressed on grinding wheels.

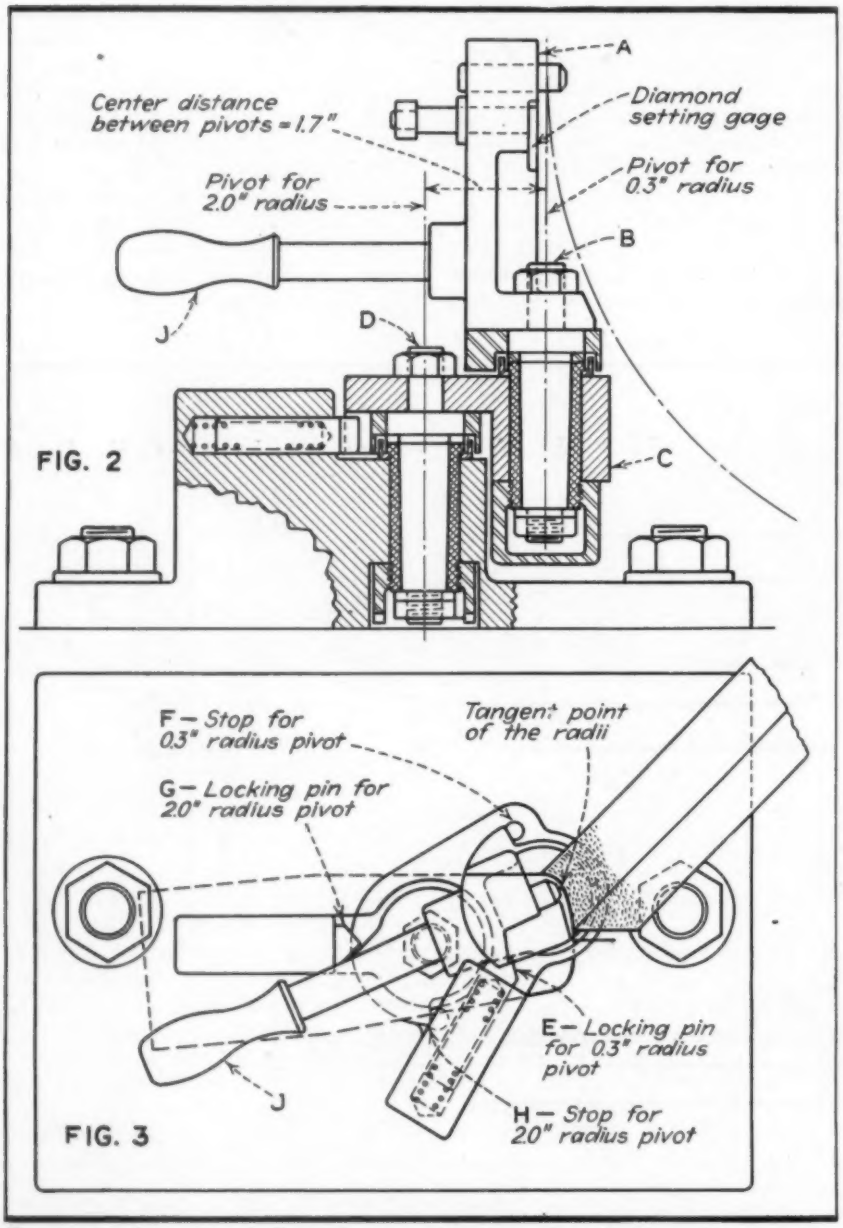


FIG. 2

FIG. 3

Tangent radii on a grinding wheel can be dressed with this tool by continuous rotation of the handle. The position of the pivot automatically changes and the full form on the wheel is produced in one sweep of the diamond

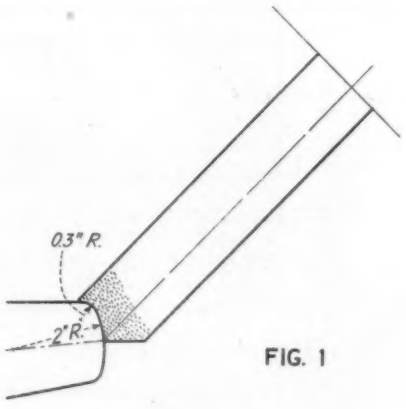


FIG. 1

Universal Jig for Drilling Holes in Round Bars

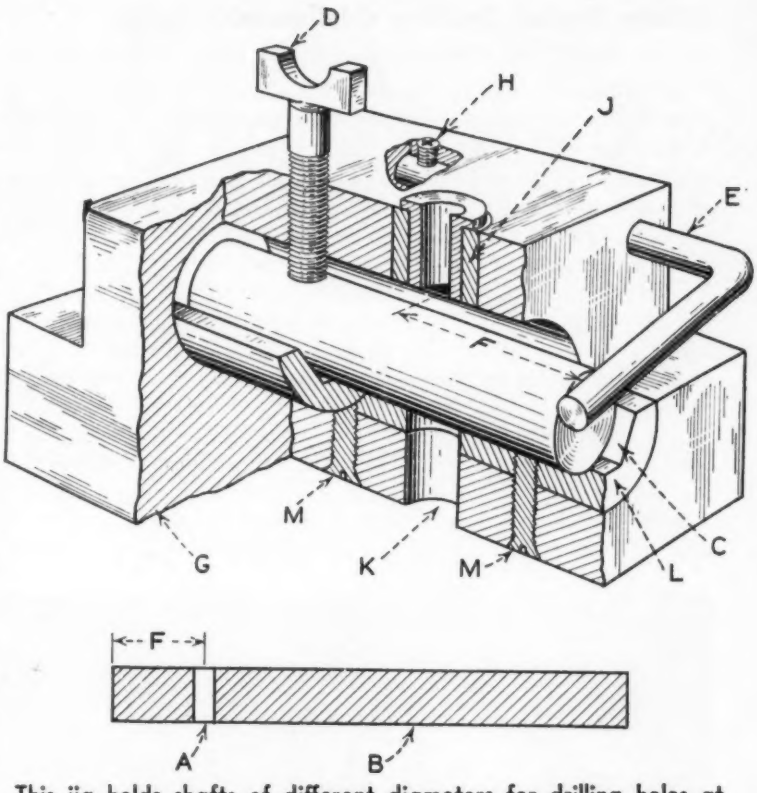
By J. H. SPERMAN

We had to drill hole *A* in a large quantity of shafts *B* ranging in diameter from ¼ to ½ in. The holes were also of different diameters for the various shafts, and were located at different dimensions from the ends of the shafts. Since it was impractical to make a drill jig for each shaft size, the jig shown in the drawing was built, which handled all sizes of shafts satisfactorily.

The shafts are placed in groove *C* and clamped by wing screw *D* after being set against stop *E*. This stop is adjustable for controlling dimension *F*, the position of the hole from the end of each shaft. Stop *E*, made from ¼-in. drill rod and bent as shown, slides in a hole drilled the length of jig body *G*, wherein it is locked by setscrew *H*. Loose drill bushings are inserted in hardened bushing *J* pressed into the jig body, the drill bushings being interchangeable to cover the various size holes required in the shafts. Hole *K* in the bottom of jig body *G* provides the necessary chip clearance.

Body *G* of the jig was made from a piece of 2 in. square cold-rolled steel, through the center of which was bored a 1 in. hole. Nest *L* for the shafts was made from a piece of 1 in. drill rod, 3 in. long; this was cut into two semi-circular pieces, one of which was slotted to form groove *C*, drilled and tapped to receive setscrews *M*, and finally hardened. A ½ in. shoulder was then cut in each end of Body *G*, after which nest *L* was assembled, completing the jig.

Once a shaft is located in groove *C* against stop *E* and clamped by wing screw *D*, the proper drill bushing is inserted in hardened bushing *J*.



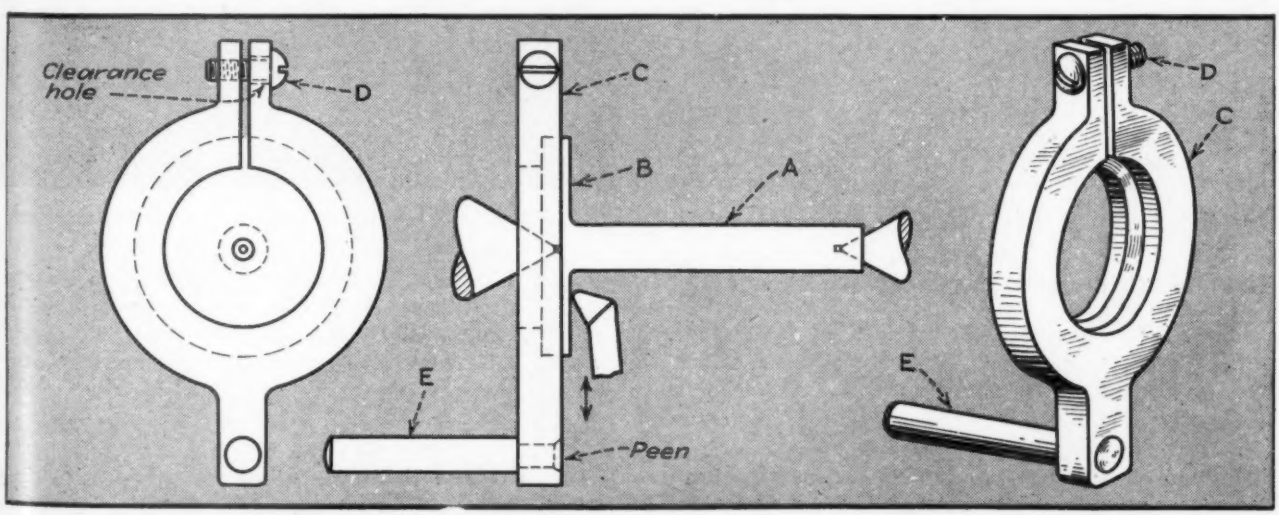
This jig holds shafts of different diameters for drilling holes at odd distances from one end of the shafts

Aluminum Lathe Dog Drives Thin Parts

By LEONARD GETLER

Gear shaft *A* shown in the drawing is but one type made by our shop in large quantities. Since the shaft must be concentric with the gear blank, they must be turned between centers; also, face *B* must be at right angles to the shaft within close tolerance. We found it advisable to finish turn face *B* and the shaft diameter by using the set-up shown in the drawing, which made it impossible to use a standard lathe dog. Therefore, dog *C* was made from sheet aluminum. Since aluminum should no longer be used for making fixtures, jigs and tools, this dog is now being from steel.

This dog was contoured on a band saw, drilled and tapped for screw *D*, recessed to fit the gear blank, fitted with driver *E*, and finally split as shown to provide the necessary draw for holding the gear blank. Although made of aluminum, it is sufficiently strong to take the torque imposed by the light cuts made when facing the gear blank and finishing the shaft diameter.



This recessed dog grips the thin gear blank, leaving sufficient space to face the blank and turn the shaft up the fillet

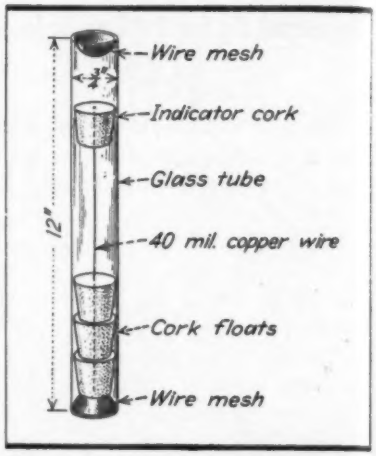
Indicator Prevents Overflow of Inflammable Liquids

By JOSEPH M. ROMLEIN, Westinghouse Electric & Manufacturing Company

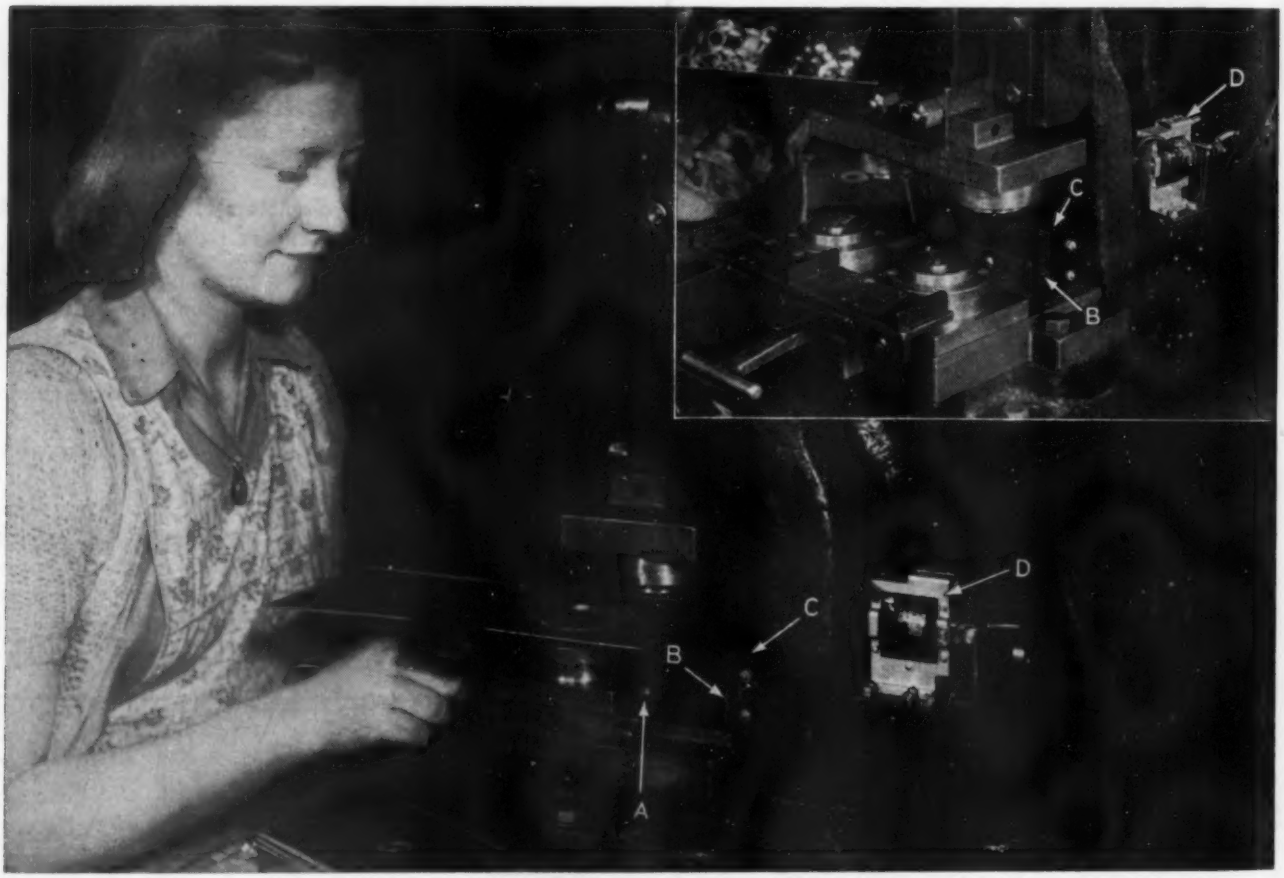
Safety cans are used for handling inflammable fluids from storage drums to the place where such fluids are required for processing, cleaning, or other operations. A flame-arresting screen in the filling spout prevents the workman from looking into the can to observe the rise of the liquid during the filling operation, which generally results in one of two things—either the container is not quite full, or the inflammable liquid overflows. The illustrated float indicator, which can be inserted in the spout of the safety can, prevents both of these from happening, since it gives the workman warning that the liquid is rising in the filling spout.

This device consists of a glass cylinder containing four corks strung on a fine wire. The three lower corks act as a float to lift the top or indicator cork. The glass tube is sealed on both ends with wire cloth so the cork assembly will remain in the tube.

The glass cylinder is inserted in the container prior to filling, and as the solution level in the can rises, the cork floats rise automatically. When the indicator cork reaches a predetermined height, depending on the type and size of the can, the can is filled. Workmen using this indicator require less time to fill a container because they can work more confidently without danger of spilling the inflammable liquid.



This indicator with cork floats is inserted in safety cans and shows workmen when inflammable liquids reach a predetermined level



The limit switch on this punch press prevents the ram from descending until the die and punch are aligned properly

Limit Switch Protects Swaging Tools

Damage to expensive swaging tools can be reduced by using a limit switch to govern the trip mechanism of punch presses, thereby preventing premature operation of the press. Their application also results in fewer miscuts and damaged pieces, especially on hand-feeding operations. The illustration shows a typical application of such a switch on a press for punching motor laminations.

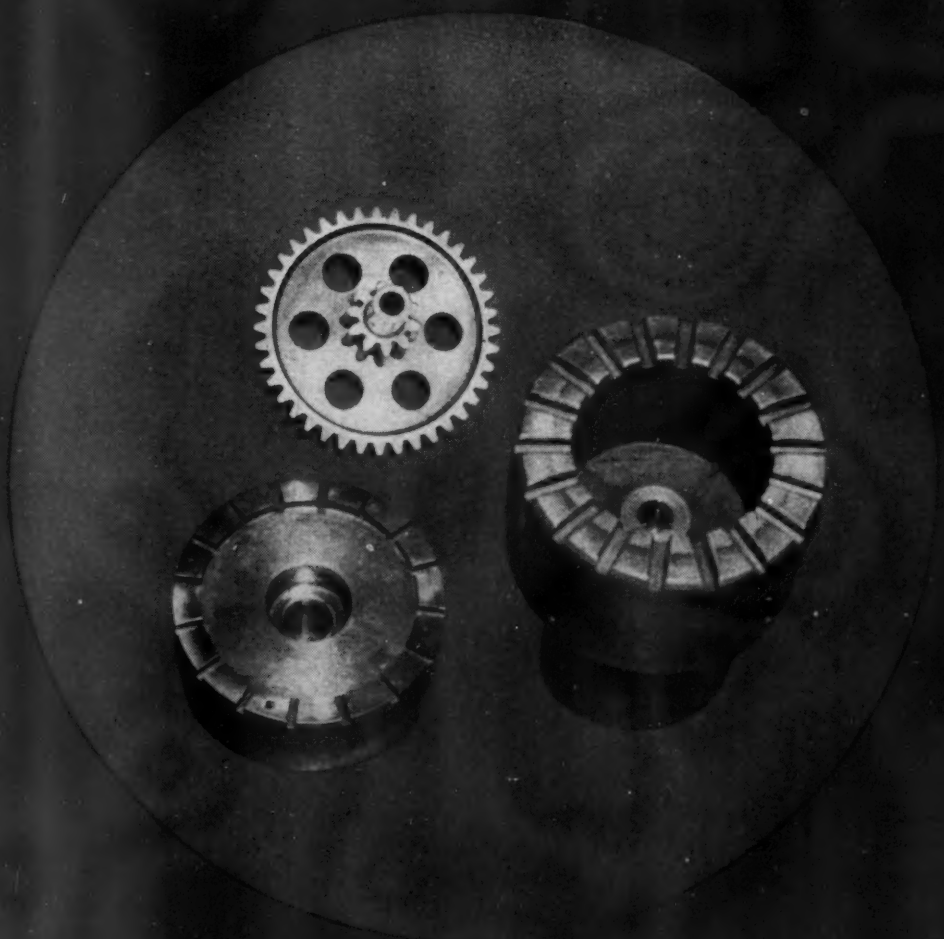
The lower part of the die is made to slide forward for convenient loading and unloading of the work. Adjustable screw *A* mounted on this part of the die actuates pushbutton *B* on limit switch *C* when the die is pushed into proper position for the swaging operation. The adjusting screw can be moved in and out to govern the location of the swaging tool on the work within limits of 0.005 in.

When the pushbutton is in, electrical relay *D* is energized, and the punch-press mechanism is released, causing the ram to descend. When the tool is in the forward position, the switch keeps the press locked-out so it cannot trip.

Armament

SECTION OF AMERICAN MACHINIST

Quenching Dies Control Shaved-Gear Quality

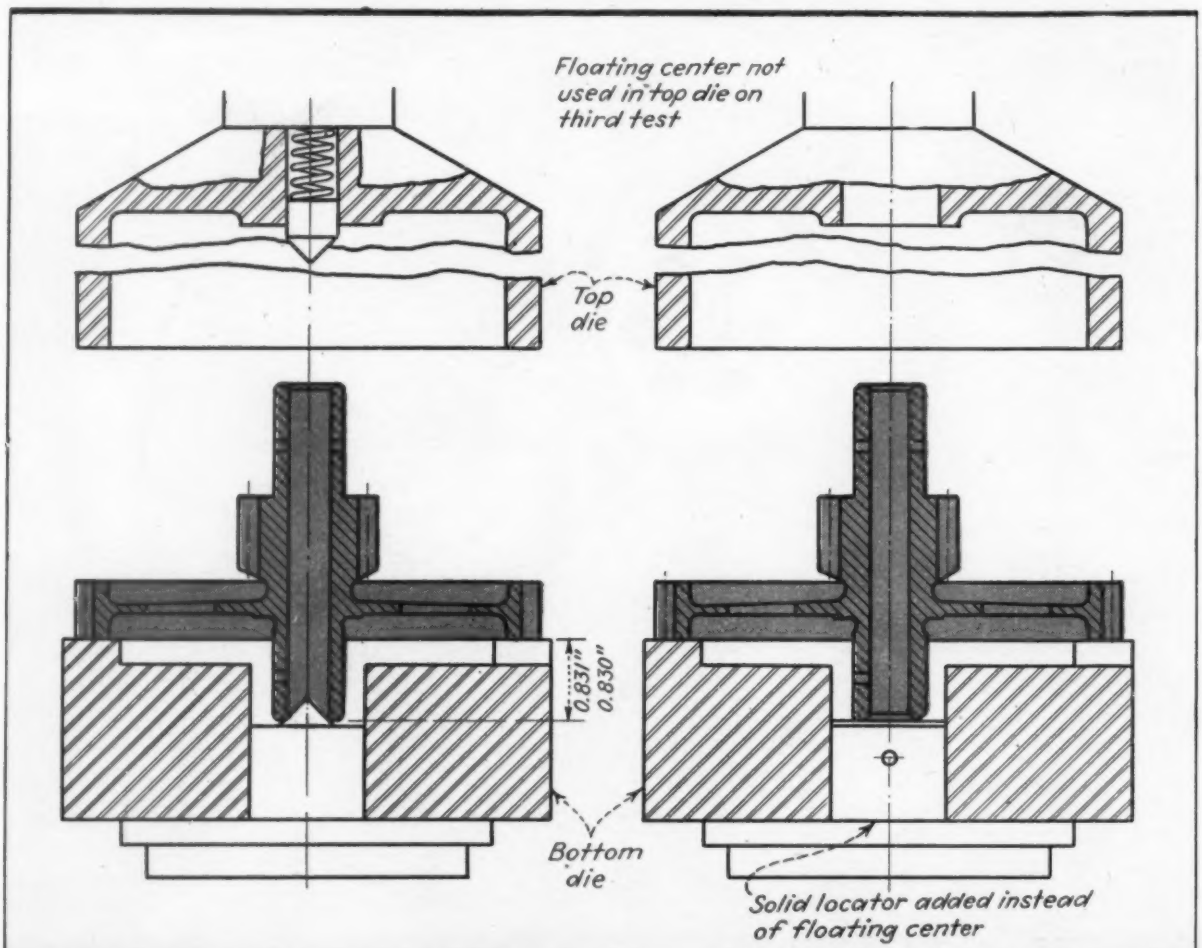


Top and bottom parts of a quenching die developed by the Ford Motor Company are shown with the shaved aircraft engine cluster gear that was selected as a critical example of the application of shaving to a hardened part. This die keeps runout of the face in respect to the bearing within blueprint limits of 0.002 in.

Quenching Dies Control Shaved-Gear Quality

IN KEEPING with the government's program to speed the production of aircraft-engine gears by shaving them instead of grinding, the Ford Motor Company has done considerable process and tool development work. As of a recent date the Aircraft Engine Plant was shaving 27 Pratt & Whitney gears, of which 13 are soft and the balance are hardened. This total includes the eleven pump gears. Ford technicians see no barrier to shaving all P & W gears eventually, and are proceeding toward that goal by tackling the problems of making a pair of mating gears at a time.

From much experience in making shaved automotive gears and recent experiments, Ford personnel believe that a shaved aircraft-engine gear can be made equal in quality or superior to a ground gear, for the reasons that there will be no burnt teeth as may arise in grinding, shaved gears have better finish, and blueprint tolerances can be maintained. Production advantages are two-fold: first, the gear can be shaved in 5 min. as compared with 40 min. for grinding, and second, large numbers of shaving machines are available for use after provision of new arbors and cutters,



Centers were added to the original experimental quenching die in an effort to keep the shaft square with the larger cluster gear, but face runout of 0.0025 in. exceeded specifications

A solid locator was next used in the bottom die in order to provide a flat surface for the short shaft extension, but no appreciable gain was achieved toward prevention of face runout

Ford Motor Company's experience with shaved gears for Pratt & Whitney engines indicates that close tolerances can and must be retained in the hardening operation by suitably designed Fixtures for Gleason quenching presses

but many gear grinding machines would have to be installed to cope with the enlarged engine building program.

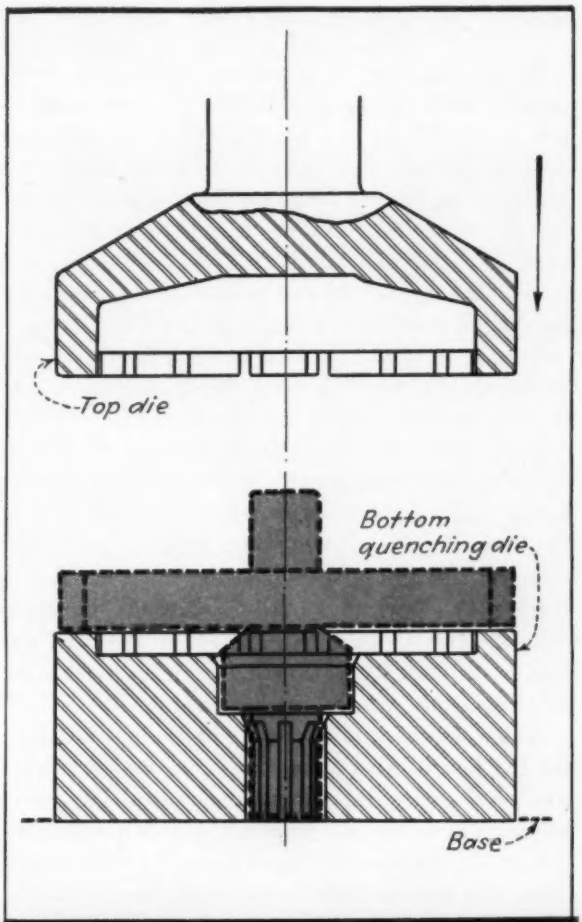
Crux of the problem of making a satisfactory shaved gear, especially one that must be hardened afterward, lies in: (1) maintenance of close-shaving tolerances, and (2) retaining those tolerances when die quenching on a Gleason press. Obviously the gear must come from the quenching fixture in a condition such that only a light polishing is needed to remove oxides, and lapping need not be done to correct dimensional errors. For no lap can follow an involute exactly, and in lapping close-tolerance gears one is likely to end up with a part that does not possess the original involute and tolerance.

To prove that die quenching can be controlled to the tolerances involved for these objectives, Ford technicians chose to experiment with the most difficult type of gear part—a cluster gear. In this P & W part, the large thin-webbed gear has 40 teeth, 20 deg. pressure angle, a diametral pitch of 8.293/10, a pitch diameter tolerance of 0.002 in., a face width of ¾ in. and a permissible run-out of the face with respect to the bearings of approximately 0.001 in.

Gears Are Cut to Close Tolerances

Machining data for this gear are as follows: The teeth are roughed on a Fellows gear shaper, then carburized to a depth of 0.035-0.40 in. The outside diameter of the gear is turned concentric with the pitch diameter and the faces are trued before semi-finishing the teeth on a Fellows gear shaper to a pitch diameter of 5.145-5.147 in. over two 0.2187 in. pins. This leaves 0.0025-0.002 in. shaving stock per tooth. Tooth-form error prior to shaving should not exceed + 0.0005 in. to — 0.0002 in. Since shaving is done on both sides of the tooth, the stock removal amounts to approximately one to one and one-quarter thousandths on each side of the tooth.

The gear is shaved to finish size of 5.140 in. over two 0.2187 in. pins. Involute error averages between + 0.00015 and — 0.00015 in., with variation per tooth of no more than 0.0002 in. Parallelism is held to within 0.0002 in. To obtain these results the shaving cutter is run at 192 r.p.m. using a gear ratio in the head of 53/31, and a slow table feed, using a 20/60 gear ratio. The tooth spacing error of the shaved gear is: from tooth to tooth, 0.0001 to 0.0002 in.; accumulated error no more than 0.0008 in.



The successful design of quenching die proved to be one in which the bearing on the longer shaft extension is placed in a close-fitting bored recess in the bottom die and the floating center is continued in the top die. Three-point location of the part in the bottom die caused the hardened gear to check within blueprint tolerances

Four series of experiments were pursued in order to develop the proper shaving technique and final results from the quenching die. For the first test run, ten pieces were shaved and hardened. The involute curve error ranged between + 0.0003 in. and — 0.0002 in. The form was corrected to lie between + 0.00015 and — 0.00015 in. by changing the table cross feed and slowing the speed of the cutter, as explained above, with the result that tooth parallelism was held to ± 0.0002 in. Gears were quenched after herdening in a fixture consisting of a top and bottom die. Location points in the die held the gear in the upright position with the longer shaft extension at the top. The gears were unsatisfactory because warpage of the face of the large gear amounted to a run-out of 0.005 in. Because of this runout, the tooth parallelism checked at + 0.002 in.

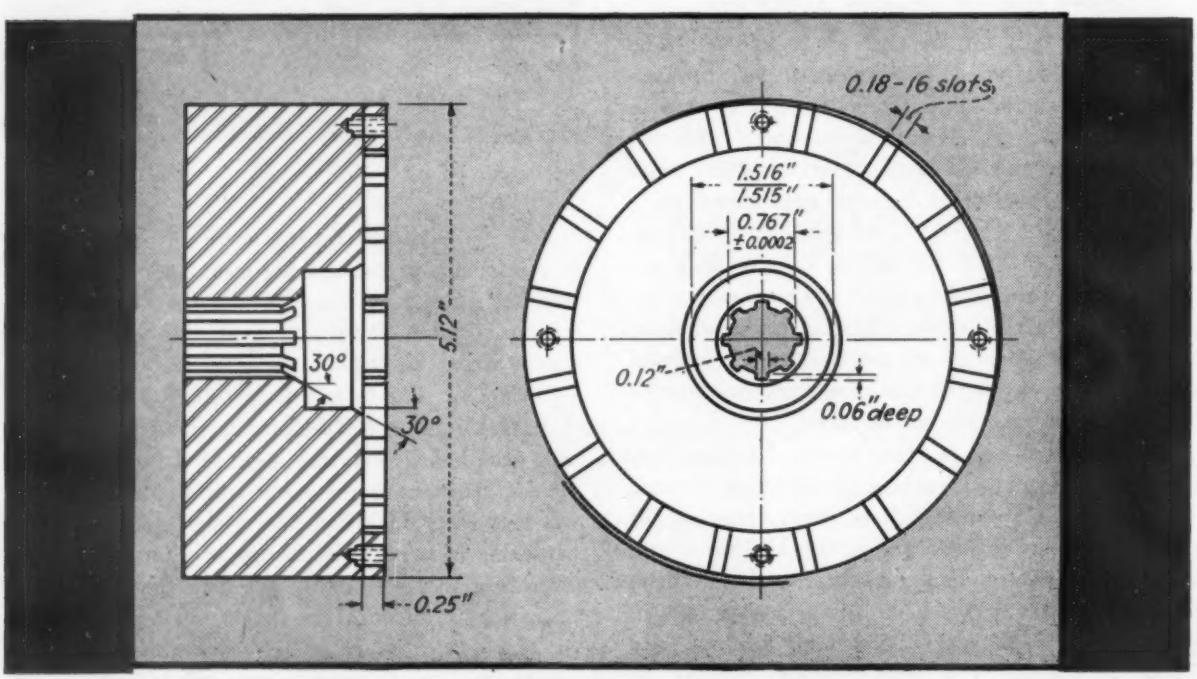
In a second test, 20 pieces were shaved, with the involute error averaging ± 0.0001 in.; tooth parallelism, ± 0.0015 in., face runout, 0.0005 in., and pitch diameter runout, 0.0012 in. A stationary center was added to the bottom die and a floating center to the top die, in an effort to keep the centers of the workpiece in alignment while quenching. Results obtained were: face runout reduced to 0.0025 in. and tooth parallelism held to an average of + 0.0012 in.

For the third test, 20 more pieces were shaved and hardened. The involute form, tooth parallelism and face runout were held to the same limits as in the second test. A change was made, however, in the bottom die of the quenching fixture. The rigid center was removed and a solid locator substituted. This allowed the shaft of the gear to rest on a flat surface while being quenched. The floating center was continued in the top die. With these modifications the dimension from the face of the gear to the end of the shaft was held to ± 0.001 in., but there was no appreciable improvement otherwise in the herdened gear.

A new approach to quenching die design was taken for the fourth experiment. This time 80 gears were cut and shaved to the previous tolerances. They were hardened, however, in a quenching fixture in which the bottom die incorporates three major location points. Thus, the bottom die is bored to receive the bearing of the longer shaft extension, and the top surface of the die supports the large gear face. The top face of the die is machined square with the bore to 0.001 in. Thus, in effect the three locating points form the three corners of an inverted triangle possessing a height of several inches. Obviously, there is little chance for warpage if the bore is made a relatively close fit with the shaft bearing, but this fit must be sufficient to permit loading and unloading the die. Hence the bore is made 0.005 in. larger than the bearing, and the bearing diameter is held uniform to realize controlled heat expansion and prevent sticking in the die. Shallow splined oil passages cut into the bore promote uniform cooling of the shaft extension. A floating center was retained in the top die.

Use of this bottom die construction produced these results. First, 75 percent of the 80 hardened gears checked within blueprint limits. Involute error ran between + 0.00012 in. and — 0.00015 in.; tooth parallelism averaged ± 0.0003 in., face runout averaged 0.0005 to 0.001 in., and the pitch diameter runout averaged 0.002 in.

No change in hardness is necessary to shave gears to the required limits. And there is no trick in shaving gears for aircraft applications, according to Ford technicians, if the semi-finish gearcutting tolerances are held close, namely about eight tenths. In shaving, parallelism should be held to 0.0003 in. on say a gear of ¾ in. face width. Nor do shoulder gears present a problem, for shoulder gears as close to 7/32 in. to the obstructing gear are being shaved. The geometry of the shaved shoulder gear will be better than a burnished one, even though the finish may not be ideal. Moreover, shaved gears will prove somewhat harder than a ground gear.



The locating hole in the bottom die is made 0.005 in. larger than the bearing diameter, and it is splined so that oil uniformly cools the longer shaft extension to avoid distortion

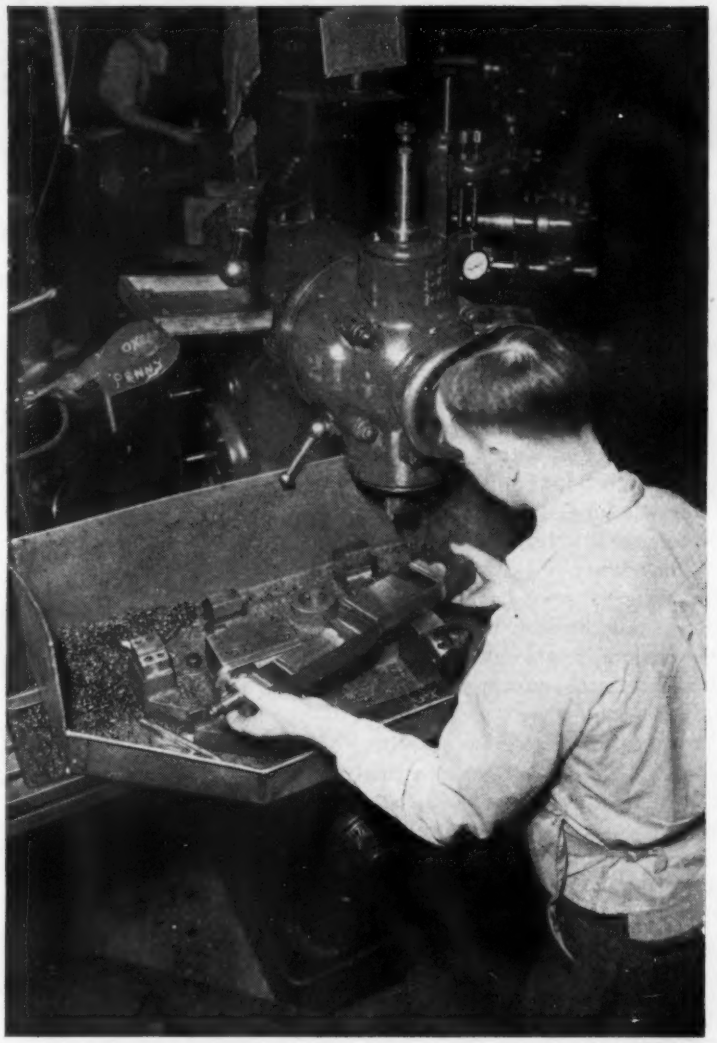
Face Milling Locating Surfaces

WHEN LAYING OUT operations for the manufacture of the body for the Boys anti-tank rifle, a Canadian small arms plant decided to secure the required accuracy of location of clamping surfaces for succeeding operations by surface grinding. Face milling of these spots with fly cutters has been substituted because greater accuracy can be obtained by this method. In addition, it has been found that one vertical milling machine with a fly cutter can do the work formerly produced on three or four surface grinders.

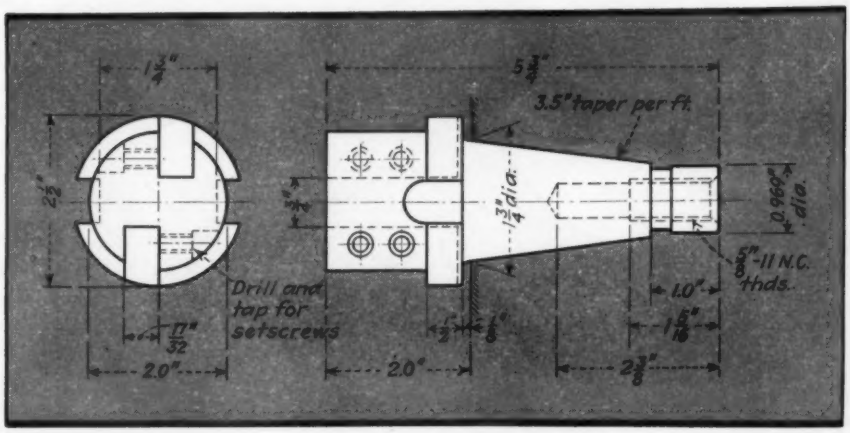
In the set-up shown in the accompanying illustrations, three locating surfaces are machined at three different levels within plus or minus 0.0005 in. of the required distances from the previously finished bore of the body. For this operation, the piece is fitted with accurate plugs in each end of the bore which are set in V-blocks on the fixture to hold the bore of the piece parallel with the table. Two ⅜-in. square bits tipped with tungsten-carbide are mounted in the 2½-in. diameter fly cutter head.

These bits are ground with zero side rake, 2 to 3 deg. negative back rake, zero side cutting edge angle, 4 to 5 deg. end cutting edge angle, a 1/32 to 1/16 in. radius at the cutting point, 3 deg. end relief angle, and with the side relief angle ground to suit the diameter of the cutter, plus about 3 deg.

Normally, these fly cutters are used at 350 ft. per min. cutting speed with a 5¾ in. feed per min. A feed of 11 in. per min. has been used with excellent tool life, but this has been reduced to the lower rate in order to obtain a smoother finish.



Milling of locating surfaces on forgings from which bodies for the Boys anti-tank gun are machined has proved more accurate than surface grinding these spots. Carbide-tipped bits are used in the fly cutters



The two bits used in this fly cutter are set with their cutting edges slightly behind center. Each bit is held in position in the cutter body with two ¼ in.-20 setscrews

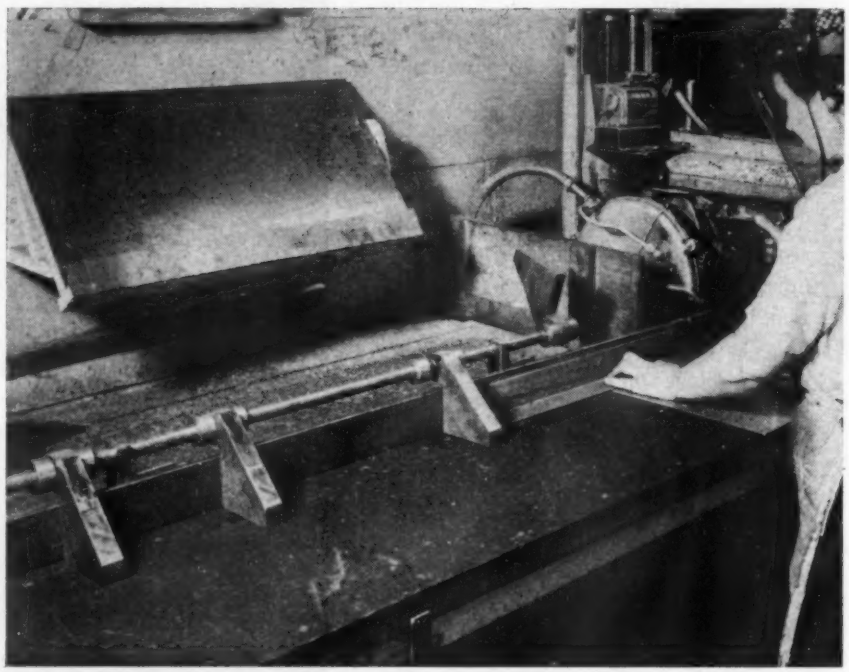
War Winning SUGGESTIONS

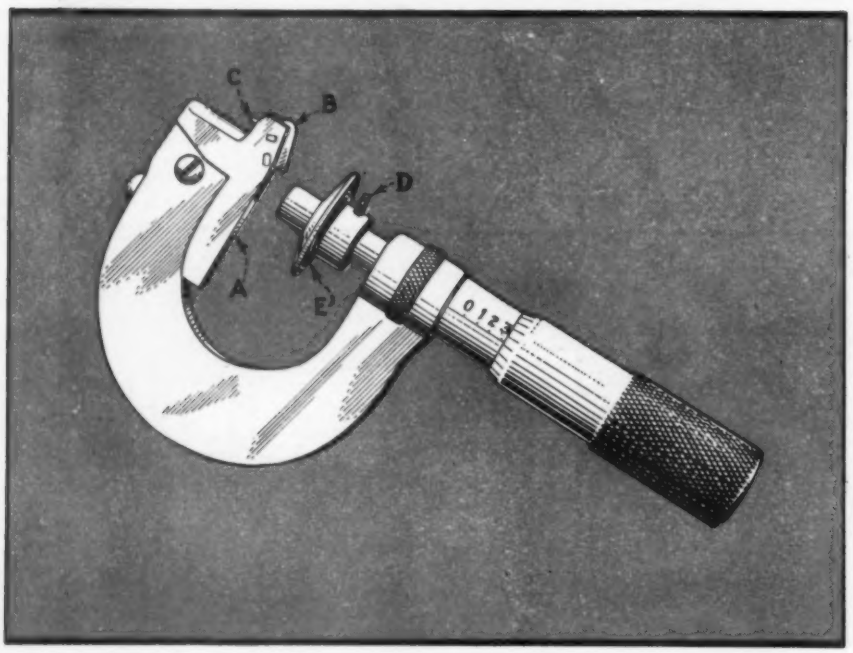
The following ideas were selected from those recognized as meritorious by the Board for Individual Awards, War Production Drive. They are freely offered to industry as an aid to its war production.

Gang Stops Speed Cut-Off Operations

The illustrated gang-stop device is used in conjunction with a cut-off saw to speed production. Formerly, the saw operator was limited to one stop with which to gage lengths of material to be cut. After one set of pieces were cut to length, the gage set-up had to be broken down and the stop re-adjusted to the new length, a time consuming procedure since large quantities of stock of different lengths are cut daily.

The gang stop device has six stops, all adjustable. They are set to accommodate the various lengths required for an order at the beginning of a run. After sawing each length, the stop for that length is thrown up, and the stop for the next length is used. *Suggested by Marvin B. McCoy, Northrop Aircraft, Incorporated.*





Micrometer Measures Width Of Angular Parts

The micrometer shown in the drawing is used for measuring the width of flats across Acme thread cutters. It was made by removing the standard anvil from a micrometer and replacing it with special anvil *A*. Blade *B* can be adjusted so that, in the case of Acme cutters, its edge makes an angle of 14½ deg. with the axis of the spindle. This adjustment is made by screw *C*. Fitting over the spindle and fastened by setscrew *D* is truncated cone *E*, the sloping underside of which makes an angle of 14½ deg. with the axis of the spindle. The included angle between blade *B* and cone *E* is therefore 29 deg., which is that required on Acme thread cutters.

When adjusting the micrometer to

give the correct reading, the spindle is first set at zero reading, after which cone *E* is moved along the spindle until it contacts blade *B*, in which position it is tightened by setscrew *D*. The micrometer will then read the width of the flat when the threading tool is placed between the blade and cone.

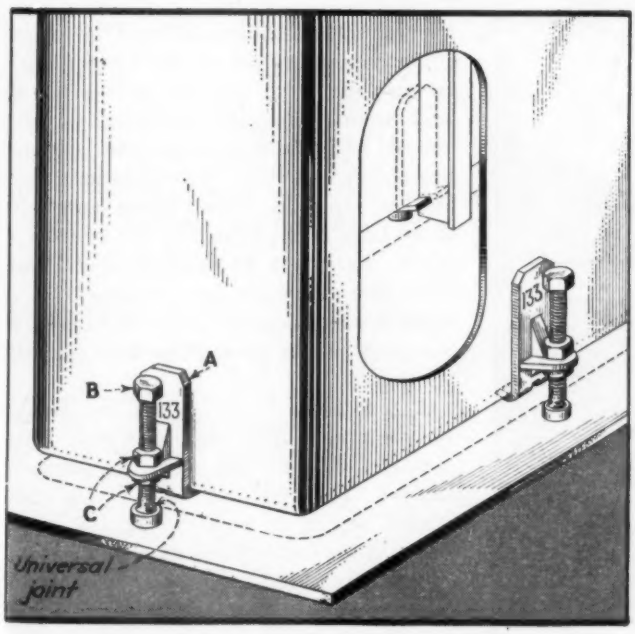
This micrometer permits greater speed and accuracy when checking Acme threading tools during turning and grinding operations, and subsequent inspection. *Suggested by Frank L. Johnson, Pratt & Whitney Division, Niles-Bement-Pond Company.*

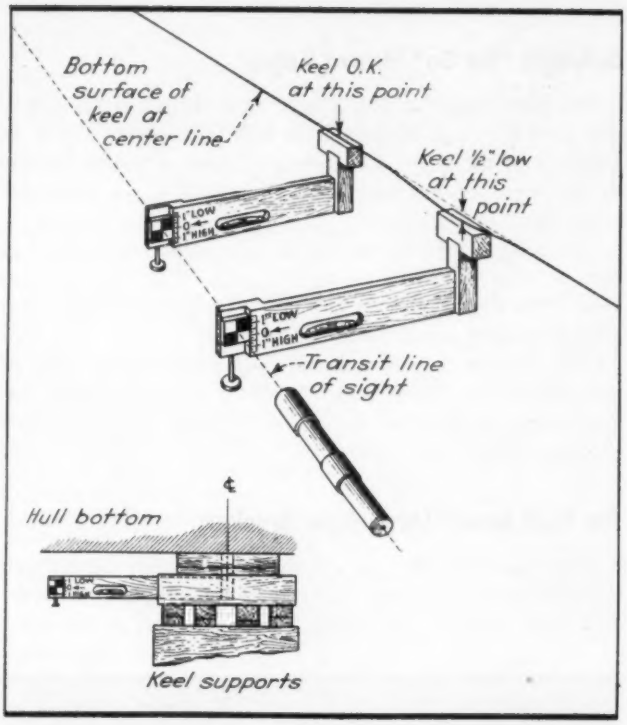
Screwjack Levels Subassemblies in Ship Construction

Deckhouses, gun foundations, bulkheads, reduction gear foundations, heavy transverse beams and similar subassemblies for ship construction must be level before welding to deck plates and sub-structures. This is done usually by welding temporary lifting brackets to the subassemblies, which are then leveled with adjusting screws threaded in the brackets. When leveled and welded or riveted in position, the welded brackets must be knocked from the subassemblies, and evidence of the weld removed before painting. A lifting jack which need not be welded to the sub assemblies is shown in the drawing.

Angle plate *A* of this jack has a short lip that fits beneath the member to be leveled. When a sufficient number of jacks are in place, the subassembly is raised or lowered at various points until level, using adjusting screw *B* to make the adjustment at each jack. Jam nuts *C* maintain the adjustment while the subassembly is being welded or riveted.

This simple device saves thousands of hours in the construction of ships, since welders need not tack them to the subassemblies, and painters need not rework the areas covered by the jacks. *Suggested by R. B. Brown, Bethlehem Steel Company.*





Ship Keels Checked With Transit Targets

The purpose of the illustrated keel leveling targets or levelers is to bring the line of the keel out from the center line of the boat to a position that permits a straight line to be surveyed the entire length of the boat. These targets are used because the keel blocks prevent the taking of measurements down the keel line.

The targets are set at the forward and aft ends of the boat from reference spikes that are set in the deck. These spikes and distances up to the bottom of the keel are the same points that were used in setting the original keel blocks. The targets that are set for running hog and sag measurements are placed 1 ft. below the original keel line so that an imaginary line along the bottom of the keel will clear all obstructions and settlement of the boat.

A transit is set up at the forward end of the boat and a line is raked through the length of the keel so that the horizontal cross-hair intersects the center of both targets. Otherwise, the horizontal cross-hair would bisect a line just 1 ft. below the original line of the keel. When this has been completed, the keel leveling device is taken to the various frame and bulkheads where it is desired to take a measurement to determine the condition of the keel.

When the target is set at zero and held level, the target is just 1 ft. below the keel. If there has been any settlement of the keel, the transit man will see it, and will have the target raised or lowered as the case may be. When the target is also on center with the horizontal cross-hair in the transit, the scale on the leveler is read to obtain the settlement of the keel at that point. Measurements are taken weekly to ascertain the true condition of the keel during the construction of the boat. *Suggested by T. B. Horne, Kaiser Company, Incorporated.*

★ WAR-WINNING SUGGESTIONS ★

Salvages "No Go" Thread Gages

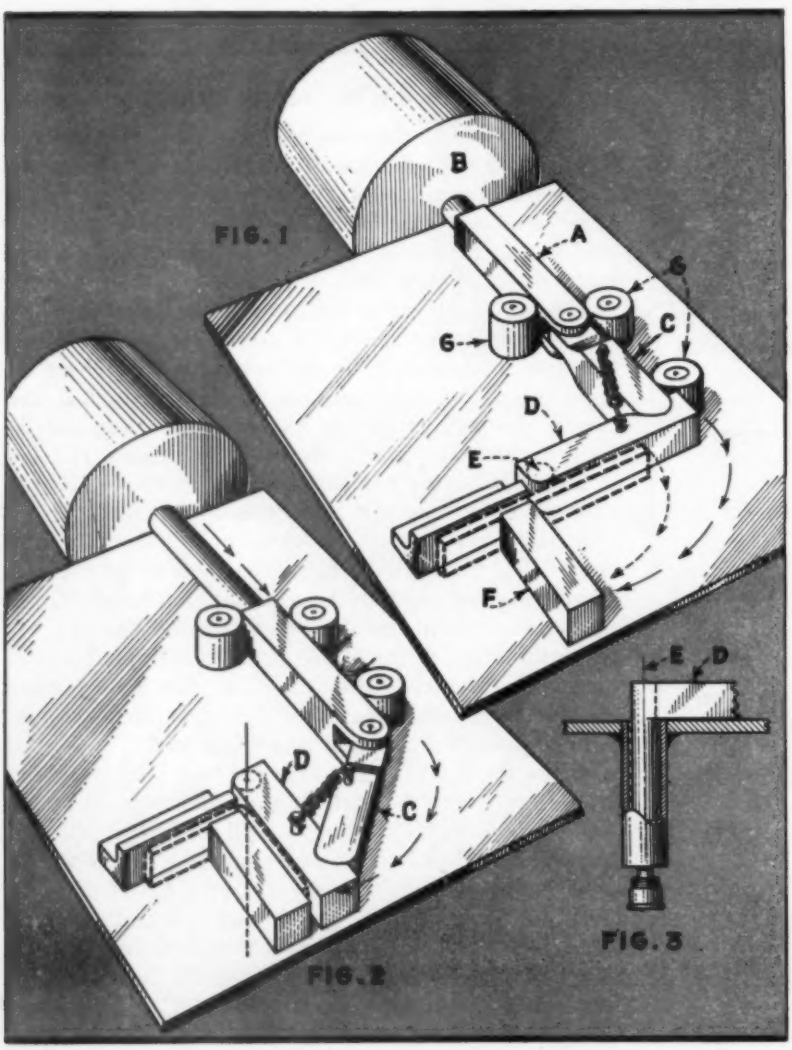
No more than the first two or three threads of a "No Go" thread plug gage are generally used, because if the hole is tapped to size, it will not permit further entrance of the gage. Consequently, wear is concentrated on these few threads. It has been general practice to scrap such gages when the wear is sufficient to make them inaccurate.

Grinding off the worn threads to a point where those remaining are to exact size permits continued use of the gage. This can be repeated several times on most "No Go" gages; in fact, all threads can be ground off to make a straight plug gage or a smaller size thread gage.

The average cost of a thread plug gage is $14. The cost of salvaging it by the method described is $1. Since 50 gages are being salvaged each week, annual saving is $33,800. *Suggested by Joseph Kahoun, Aircraft Engine Division, Packard Motor Car Company.*

Air Tool Bends Large Pipe Brackets

Pipe brackets used aboard ships are usually bent to an angle of 90 deg. or less. Because of the simplicity of making such brackets, they were usually marked at the bend line, heated with an oxyacetylene torch, and bent over a block by hammering with a sledge. This proved to be too time consuming because of the number of brackets required daily, and too often the brackets had to be reworked when applied aboard the ship, since the bends were inaccurate.



The illustrated pneumatic bender was built to form these brackets accurately and in numbers needed to meet production schedules. Piston *A* operating under air pressure of 90 lb. per sq. in. in cylinder *B*, moves connecting rod *C* to swing lever *D* about pivot *E*. The angle to which the bracket is bent is controlled by the position of stop block *F*. Figs. 1 and 2 show the positions of bracket before and after bending. The position of block *F* can be changed for the different angles required on the various pipe brackets.

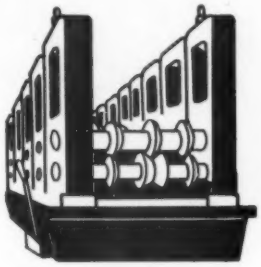
The bar stock is placed as shown in Fig. 1 with punch marks on the bend line registering with the corner of stop block *F*. Air pressure of 90 lb. per sq. in. will bend stock up to ½ in. thick. Side thurst on piston rod *A* is naturally high, and is counteracted by rollers *G*. Pivot *E* is long and fitted in a bushing welded to the underside of the table as shown in Fig. 3. Connecting rod *C* fits into a socket in lever *D*, and these two parts are held together by a coiled spring. Reversing the air supply to piston *A* swings lever *D* back to starting position.

A pipe bracket can be laid out, set-up and bent in 6 min. with this tool. This compares with 22 min. with the previous method. The reduction in 16 min. per bracket results in a saving of 140 man-hours in the construction of a ship having 543 pipe brackets. *Suggested by Byron M. Johnson, Oregon Shipbuilding Corporation.*

Methods for Forming Aircraft Sheet Metal — III

Courtesy Douglas Aircraft Company

CORRUGATING AND FORMING ROLLS



A single-purpose machine for making corrugated sheets or hat sections on a production basis

Machine Efficiency

A=Excellent; B=Good; C=Fair; D=Poor

Number of Parts	Cost	Speed	Accuracy
1-5	D	D	A
5-50	D	D	A
50-500	D	D	A
500 & Up	B*	B*	A

* If rolls are on hand, all costs and speeds marked with an asterisk should be rated "A."

NOTES:

Die cost—extremely high
Set-up cost—extremely high
Operating cost—very low

Corrugations are made for stock.

Materials Formed

All commonly used metals may be formed on these machines, within the limiting bend radii of the metals used.

Design Considerations

1. First design consideration is to try to use standard corrugation which can be made with rolls on hand.

2. When less than 2000 full-sheet corrugations are needed, and rolls are not available, part will probably be formed on power brake.

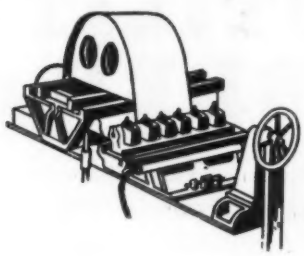
Limitations

Maximum width of flat sheet (developed width of corrugation) depends on machine capacity.

Maximum width of corrugated sheet is dependent upon corrugation dimensions.

No limit on length of sheets.

STRETCHER PRESS



A machine for forming compound contours in sheet metal through stretching over a form block

Machine Efficiency

A=Excellent; B=Good; C=Fair; D=Poor

Number of Parts	Cost	Speed	Accuracy
1-5	C	B	B
5-50	A	A	B
50-500	A	A	B
500 & Up	B	B	B

NOTES:

Die cost—moderate
Set-up cost—moderate
Operating cost—moderate

Experimental cost on new-type dies may be high.

Materials Formed

1. Aluminum (2SO, 3SO) probably can be used satisfactorily, but harder materials are generally used to better advantage.

2. Aluminum alloy (24SO, 24ST) in both hard and soft grades may be used with equal facility. Use of hard stock is recommended because it eliminates the heat-treating operation. Stretching does not scratch Alclad.

3. Magnesium alloy—No stretcher press work has been done with magnesium but is probably feasible.

4. Corrosion-resisting steel (18-8) has very good forming qualities. Possible limitation might be power available for yielding stainless.

Design Considerations

1. At present, sheet-metal skin contours, and other faired sheet-metal sections are the principal uses of the stretcher press.

2. Much larger areas may be included in a single contoured sheet than previously permitted by the Hydro-Press contouring method.

3. Contours may be formed to advantage with hard stock, thus eliminating the heat-treating operation.

4. Either right- or left-hand parts may be made with same die. Contoured parts may be "snapped through" to produce part of opposite hand (reverse contour).

5. To determine sheet stock size to be specified, add allowance for gripping metal. This added material may represent a high percentage of material waste for smaller parts.

Limitations

	Max.	*Min.*
Length	20-25 ft.	24 in.
Width	86 in.	None

Minimum inside radius at the pull-line is 1½ in.

Two Reasons Why You Get Greater UTILITY from WEBBER Gage Blocks

First—The Webber set of gage blocks gives you double the measurement range or about 250,000 size combinations. This is accomplished with a new .10005 inch block which permits measurements in steps of one half of one ten thousandths of an inch instead of steps of one ten thousandth of an inch.

Second—You can get more wear from a set of Webber Gage Blocks. This is made possible by including in every set a pair of .100 inch "wear" blocks to save unnecessary wear to the rest of the blocks in the set. These wear blocks can be wrung on the top and bottom of a stack of blocks and used for contacting the work. You always expose the same sides of the wear blocks to the work thus preserving your master blocks and assuring continued accuracy of measurements. In addition Webber offers you 10% salvage on all replacement blocks in exchange for your worn or damaged blocks.

Webber Gage Blocks are made under ideal manufacturing conditions—on the most modern equipment—by skilled, experienced craftsmen. Grade A blocks are made to accuracy of .000004 inch, grade B to accuracy of .000008 inch.

Webber, the largest exclusive manufacturer of precision gage blocks, can make attractive delivery on both A and B accuracy sets.

You get all of these advantages at no additional cost.

Set 84A—$350.00	**Set 84B—$235.00**
Set 43A— 185.00	**Set 43B— 150.00**
Set 38A— 195.00	**Set 38B— 155.00**

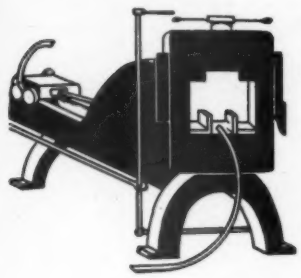
Webber GAGE COMPANY

12901 TRISKETT RD., CLEVELAND 11, OHIO

AMERICAN MACHINIST REFERENCE BOOK SHEET

Methods for Forming Aircraft Sheet Metal — IV

DRAW BENCH



A machine for drawing strip stock into formed lengths

Machine Efficiency

A=Excellent; B=Good; C=Fair; D=Poor

Number of Parts	Cost	Speed	Accuracy
1-5	D	D	A
5-50	C	C	A
50-500	A	B	A
500 & Up	A	A	A

NOTES:

Die cost—moderate
Set-up cost—moderate
Operating cost—moderate

Materials Formed

Aluminum (2SO, 3SO) may be drawn easily.

Aluminum alloy — Soft stock (17-SO, 24SO) may be drawn easily. Hard stock (17ST, 24ST)—in the experimental stage.

Magnesium alloy (MA, MH, AM-3SO, AM3SH) in experimental stage.

Corrosion-resisting steel may be drawn easily.

Design Considerations

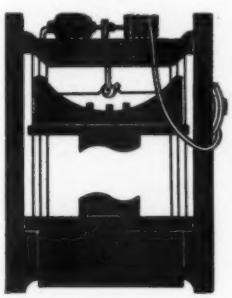
Specify standard sections wherever possible.

Limitations

In general, same minimum bend radii as for straight brake bends may be used.

Limiting dimension for parts which must be heat-treated is usually the furnace length, although pieces 40-ft. long can be drawn and then cut to suitable lengths for parts.

DROP HAMMER



A low-production machine for severe forming by drawing and controlled compression failure

Machine Efficiency

A=Excellent; B=Good; C=Fair; D=Poor

Number of Parts	Cost	Speed	Accuracy
1-5	C	C	B
5-50	B	B	B
50-500	C	B	B
500 & Up	D	C	B

NOTES:

Die cost—fairly high
Set-up cost—moderate
Operating cost—high operating cost per part.

Certain types of drop-hammer dies must be replaced after several hundred parts because of excessive wear.

Materials Formed

1. Aluminum (2SO, 3SO) is the best metal for severe drawing operations.

2. Aluminum alloy — Soft stock 24SO, 24SOAL) is used for medium draws which can be made in one or two hits. Hard stock (24ST, 24STAL) is rarely used because of springback and work-hardening difficulties.

3. Magnesium alloy (MA, MH, AM3SO, AM3SH)—Good forming characteristics with heated sheet and dies.

4. Corrosion-resisting steel (18-8) —Excellent for drop hammer forming in annealed condition only. Hardened metal ruins dies except in very thin gages.

Design Considerations

One does not design for the drop-hammer, but if the part has not been designed so that it will form on any other machine, the piece is adapted for drop-hammer production, viz:

1. Sharp bends, which cannot be formed on the Hydro-Press, necessitate forming entire part on drop hammer.

2. Since drop hammer work involves some drawing action, sharp radii result in excessive work hardening, causing part to crack. Sharp radii also cause, excessive die wear.

3. Symmetrical draws form better than do unsymmetrical shapes.

Limitations

There are no specific maximum forming limits for drop-hammer work —results depend on method of reduction, skill of the operator and elongation of metal.

(To be continued in an early number)

DRILLING CLUSTER GEARS

FORGINGS OF ALL KINDS ARE MOST EFFECTIVELY DRILLED WITH AMPCO HAMMER FORGED, POLISHED FLUTE DRILLS.

AMPCO TOOLS

AMPCO TWIST DRILL CO.

JACKSON, MICHIGAN U. S. A.

CHICAGO . DETROIT . CLEVELAND . PHILADELPHIA

Distributors in All Principal Cities

An Unassailable Rule

BRITISH AND AMERICAN air forces not long ago staged a daring and costly raid upon Germany's ball bearing factories.

The price paid was heavy in numbers of planes and of men lost. It was so expensive, in fact, that high military men thought it desirable to point out that the results were worth the cost, because a substantial portion of Germany's facilities for producing ball bearings had been knocked out.

Ball bearings are a key item in the manufacture of all kinds of war weapons. Any action that would disrupt their production would be worthwhile, though expensive.

This brilliant and successful raid was an outstanding success and now is known by all Americans. But what Americans generally do not know is that a considerable percentage of the ball bearing output of our own country has been knocked out the past few weeks to the serious detriment of our war production effort. Armament plants dependent upon ball bearings have, in turn, been compelled to curtail their operations.

It didn't take German bombs or German sabotage to bring about this condition so favorable to the Axis. It was much easier than that; unfortunately good, loyal Americans did the neat job themselves.

Selective Service boards, apparently unaware of the serious consequences of what they were doing, insisted upon drafting from the ball bearing factories enough skilled workers that manufacturing schedules had to be reduced.

Surely nothing is to be gained in a military way and much is bound to be lost by such action. When are local boards going to learn that military strategy and production of weapons go hand in hand and that the former is crippled without the latter? Our military and naval successes can be speeded to final victory only when we have a preponderance of weapons so great that we can smother the enemy. We cannot achieve such preponderance by transferring men with manufacturing experience from the lathe to the military training camp.

All of this is said with full realization that the armed services must have men and that the wells from which men have lately been drawn are beginning to dry up and other sources must be tapped.

It also is said with knowledge that some manufacturers have selfishly attempted to hold out of military service men whose experience and skill were small.

It is no secret, however, that many war factories outside the ball bearing industry also have been hard hit by the draft. Their key personnel has been lifted out of the plants and into the Army or Navy to the detriment of war production.

A high official in Washington, thoroughly familiar with the tight manpower situation, sticks unflinchingly to his contention that local Selective Service boards should adhere to only one rule in determining whether a man should be inducted or deferred. The rule is, "Where can he be of the greatest service to his country?"

That rule is unassailable. Nobody can seriously quarrel with it. Whenever members of local boards are uncertain regarding the right course to pursue, they should apply that rule. If local boards at the same time have a true appreciation of the vital relationship of war production to final victory in the field, they should have no qualms of conscience about deferring experienced war workers.

To do anything else would be harmful rather than beneficial to the war effort as a whole.

Burnham Finney

Gaging Business

Important shifts are being made in war production because of manpower shortages and in anticipation of changing the focus of effort from Europe to Japan as the war with Germany draws nearer its close. For one thing, a drastic realignment of the naval program is expected to put a great strain upon the "heavy" shipyards, particularly as more large-size aircraft carriers are built.

More war production areas are to be labeled "critical" during the next few months. An effort is under way to relieve some areas by transferring work elsewhere. Akron is an example. Some war contracts have been removed from that city to Texas. Washington is considering limiting Akron's operations mostly to making tires and tubes, both of which are badly needed.

WPB's chief worry continues to be the difficulty of securing still higher output of military planes. October saw the figure go over 8,000 units for the first time, but the prospect is not promising for getting up soon to the desired 10,000-a-month. Though much pressure is being applied, several big plants are not doing well.

Ordnance production is so good and accumulation of ordnance items in warehouses so large that as soon as the war with Germany ends, a reduction of at least 50% in output is looked for. The decrease may be much more than that. Even with steadily increasing ground troops in the fight against Germany calling for larger quantities of heavy armor and supplies, the time appears not far off when more cutting of production must be done.

Cancellations of war contracts have been larger than realized. Army and Navy are "revising" more than 8,000 prime contracts. In most cases facilities have been shifted to other lines for which an immediate need exists. But that policy will soon begin to run out in a number of categories.

Supplies of principal raw materials are ample. Within a few months certain materials may be so plentiful that a slackening in their production may be ordered. Little increase in manufacture of civilian heavy goods is in sight, however, because of lack of manpower. Many companies could resume normal output with very little material.

Allocations of major ferro-alloys will shortly be removed because of the easier position in all of them except nickel. Vanadium, tungsten, molybdenum and manganese are among the alloys affected. Next step will be easing of restrictions on alloy steel analyses.

Steel production is expected to stay at or close to full capacity for some months. Demand for plates, sheet and certain other steel items will be heavy, but structural steel will be off because the war construction program is mostly completed. The rising volume of contract cancellations, plus "peace scares," have the steel people worried about huge inventories in consumers' hands as well as large quantities of raw materials in their own yards.

There is no change in the trend toward lower sales and production of machine tools. Unfilled orders on Oct. 1 were $333,119,000, or 14% less than the previous month. Net orders during September amounted to $31,759,000. September shipments from factories totaled $85,842,000. Many builders are busy getting into direct war work to augment their declining output of machine tools.

Liberated Europe Expected to Utilize Our Used Equipment

Surplus tools might be used in civilian production in war-torn areas. Russian tool needs cut 60 per cent due to shipping shortages. Lend-lease orders carefully screened

WASHINGTON—The best suggestion of possible disposal of large quantities of used machine tools and other types of industrial equipment in the hands of federal agencies was the proposal of some government executives that this might be used to help rehabilitate the liberated nations in Europe. It is pointed out that this equipment could well be used for civilian type activities in North Africa, Italy, Greece, Yugoslavia, France, and other European areas as soon as they have been retaken by Allied troops. This possibility overcomes the objection of some officials to the shipment of the equipment to our Allies, since they could not very well use it in war production requiring very close tolerances.

Lend Lease Use Possible

It is reported that this idea is receiving top consideration, and that conversations have been held between Lend-Lease and the War Production Board concerning the possibilities of also disposing of some of the material to our Allies. Industrial equipment other than machine tools could easily be used by our Allies, but the fact is that listings of this material have not been made available in great volume until some two months ago, when the Army began listings its volume of unneeded items. In any event, it is fully appreciated here that there would be no point in shipping entirely new tools abroad and keeping all the used ones here, nor would it aid the industry in its postwar foreign markets if units sent abroad were unsuitable.

Russian Orders Curtailed

Russian machine tool reuirements have been curtailed by about two-thirds because it is reported that warehouses in the United States are still holding many tools awaiting shipment to Russia. So long as this inventory cannot be shipped, Federal officials see no point in buildnig it up.

Meanwhile, Lend-Lease orders for machine tools continue to undergo careful screening. Not only are orders gone over carefully here in the light of business already on hand or awaiting shipment, but they are also screened by our representatives abroad. In fact, an Australian order after being screened there, goes to England for screening and to determine whether or not the machines can be built in England rather than in the United States; then after the English have gone over the list it is returned to Australia, which then places its respective orders with the United States and Great Britain. Finally, upon their arrival here, the orders are screened by the Lend-Lease headquarters. No machine tool shipments are permitted unless specifically required for war purposes.

Lend-Lease Keeps Control

An interesting sidelight on Lend-Lease shipments of machine tools is that when an order is cancelled after the tool has been put aboard ship and is on its way, the Lend-Lease office has the machine frozen at its destination, until a specific Lend-Lease order for it in that country or some other Allied Nation is available.

WPB HITS LABOR HOARDING

WASHINGTON—The WPB's action to cut down the manpower requirements of the North American Aviation plant at Dallas, Texas, is reported to have marked the launching of similar action against over a hundred big war production plants. Besides easing manpower shortages in critical areas, the move is designed to withdraw labor "excesses" from plants reported to have been "hoarding" manpower for many months. The Dallas action stemmed from hearings before the Truman Committee, and the prompt manner in which determination of excessive manpower requirements was arrived at by WPB representatives indicated the possibilities of similar drives elsewhere.

See Worsening Manpower Picture With no Easing Until Mid-1944

WASHINGTON—Major hope in relieving manpower shortages over the next six months lies in the ability of industry and Federal agencies to draw into the labor force a good portion of the estimated 5,500,000 women who do not have children under 16, do not live on farms, and are not now employed, according to informed government sources. It is stated that the bulk of these women would be available for part-time work, but that many industries have failed to provide for employment on this basis. In fact, War Manpower Commission representatives point out that many high school children could also be drawn into war work in critical manpower areas by some split-shift arrangement.

Apron Shift Cited

WMC spokesmen point out two outstanding examples of the utilization of part-time women workers and high school children. The Bell Bomber Plant has a special "apron" shift of four hours for women, while Timken Roller Bearing has an entire shift manned by high school students, called "four-four" workers, i.e., four hours at school and four hours at work.

Critical Areas Increased

Informed sources believe that the manpower problem will grow worse before it gets better, and that the manpower crisis will not begin easing until after the first quarter of 1944. Areas regarded as critical by WMC totaled 71 in September, as against only 31 in January, 1943, despite concentrated efforts by WMC, the U. S. Employment Service, the War Production Board, and other Federal Agencies to relieve conditions in critical areas. Latest two areas to be removed from the critical list are Dayton, Ohio, and Dallas, Texas. The situation at Dallas was straightened out largely by the device of rescheduling the work at North American Aviation's plant there, whose original manpower requirements at peak operations had been estimated at 19,000 but were later reduced to 1,800—more than a 90 percent cut!

More Cancelled Contracts

Contract cancellations and revisions in critical areas to reduce manpower needs are expected to be resorted to more often in the future, especially since the nation is now comfortably situated on many war items and can afford to "trade" labor from one type of war production to another. The shifting of some naval contracts from West Coast yards to the East Coast was largely based upon manpower considerations.

The U. S. Employment Service is keeping close track of the situation in critical areas by its form ES-270, which is being filled out monthly by plants in such areas with the aid of interviewers from USES. The form shows each plant's current employment, employment a month ago, 2 months ago, 6 months ago, and a year ago, besides the latest projection of future manpower requirements.

CMP "B" Applications To Be Handled by District Offices

WASHINGTON—As a further move toward decentralization, the WPB has delegated authority over CMP application for material required to produce "B" products and repair parts, involving small quantities of steel, copper, and aluminum, to its various district offices. The move is also designed to save paper work.

This is expected to save 62 percent of the number of applications that manufacturers have had to file, or a reduction from 210,000 annually to 80,000 under the new plan. The reason for the effectiveness of the action in reducing paper work is that small materials users taking 10 percent of total allocations actually filled out 85 percent of the CMP-4B applications submitted to WPB in recent quarters.

The announcement revealed that small users who had applied for their first quarter 1944 allocations will be allotted instead their full-year 1944 requirements based upon their past experience under CMP.

Golden Anniversary

CLEVELAND—Marking its first 50 years in business, the Elwell-Parker Electric Co., of this place, has published a volume reviewing its development since 1893 against the background of the nation's progress in the same period. Entitled "Lengthened Shadows," and written in an informal news style, the book covers the growth of the company, and, to a considerable extent, that of the industrial truck industry after 1906, the year that Elwell-Parker furnished motors for the first crude baggage-handler for the Pennsylvania Railroad.

Gear Manufacturers Adopt New Technical Standards at Meeting

CHICAGO—War and postwar problems of the gear industry were discussed during the busy three-day semi-annual meeting of the American Gear Manufacturers Association held at the Edgewater Beach Hotel, October 25-27. Sessions were opened with a brief address by A.G.M.A. President Russell C. Ball, Philadelphia Gear Works, before the largest attendance in the association's history.

George P. Maurer

Russell C. Ball

Report on New Standards

A major accomplishment reported at the meeting was the progress made in compiling new technical standards under the direction of S. L. Crawshaw, Western Gear Works, chairman of the general standards committee, and in bringing existing standards up to date by the technical editing committee under the chairmanship of Walter P. Schmitter, Falk Corp.

Business phases of the industry, including the vital subject of war contract termination, were ably handled by W. L. Schneider, Falk Corp., and his general commercial committee.

Manpower Discussed

An excellent discussion of many sides of the manpower problem was conducted by E. S. Sawtelle, Tool Steel Gear & Pinion Co. Association members acted as discussion leaders on such subjects as best use of available labor, handicapped workers, T.W.I. training programs, absenteeism, pension plans and women workers.

George H. McBride, Westinghouse Electric & Manufacturing Co., presented a government relations report which was followed by a general discussion of the subject.

In a technical paper on gear motors, C. B. Connell, Westinghouse Electric & Manufacturing Co., described the design and application of this class of equipment according to A. G. M. A. standards. The author showed that much of the confusion which has existed in the past can be cleared up through the use of uniform methods.

Would Standardize Hobs

George P. Maurer, the Falk Corp., spoke on standardized hobs and pointed out some of the steps that must be taken to eliminate existing variations in this type of tooling. An A.G.M.A. committee has been appointed to cooperate with cutter and machine manufacturers to complete the existing partial standardization.

"Cutting and Hobbing Worms and Gears" was the subject of a paper presented by D. W. Dudley and H. Poritsky, General Electric Co. The authors described mathematical solutions for flank curvature of worms and cutters. The process eliminates trial-and-error methods with resultant economies in toolmaking and inspection time.

Discusses Free Enterprise

A luncheon meeting on October 25 was addressed by Homer McKee, vice president, Roche, Williams & Cunnyngham, on the subject of free enterprise. This speaker admitted the necessity of regimentation and bureaucracy under wartime conditions but emphasized the need for full return to a system of freedom of opportunity if American ideals are to continue.

Joe James Custer, United Press war correspondent, was the principal speaker at the semiannual dinner. He told of his experiences with our forces in the Pacific theatre of war.

The Association announced a new class of membership designed to permit representatives of the technical press fuller participation in its activities.

At 80th Anniversary—As Ferracute Machine Co. celebrates its 80th anniversary, President George E. Bass, center, displays company-made cartridge cases to visitors. In the left foreground is Luther C. Meyers, chief engineer; in the right foreground is Capt. E. W. Lafferty, Philadelphia Ordnance District

Inside Detroit

Rapid postwar return to pleasure car production foreseen. Makers strain at the barrier, ready to dash into the promised land of lush postwar markets. Government speed in clearing out inventories, making facilities available, is important

Pleasure Car Output Quickly Whenever Uncle Sam again permits the manufacture of passenger cars on a sizable scale, the country will witness the hottest competitive race in history among automobile companies to be the first out with new cars. Just how long it will take the big companies to produce the first cars will depend upon a number of uncertain factors, but it is a reasonable bet that the time will be shorter than the public now thinks.

The minimum period for getting started, if "things are right," will be 60 days for General Motors. The report is being circulated that Ford can make the shift that rapidly too, or perhaps even faster. A great deal of Ford's car-making equipment is said to have been unaffected by war production. Just where Chrysler stands in this matter is not known.

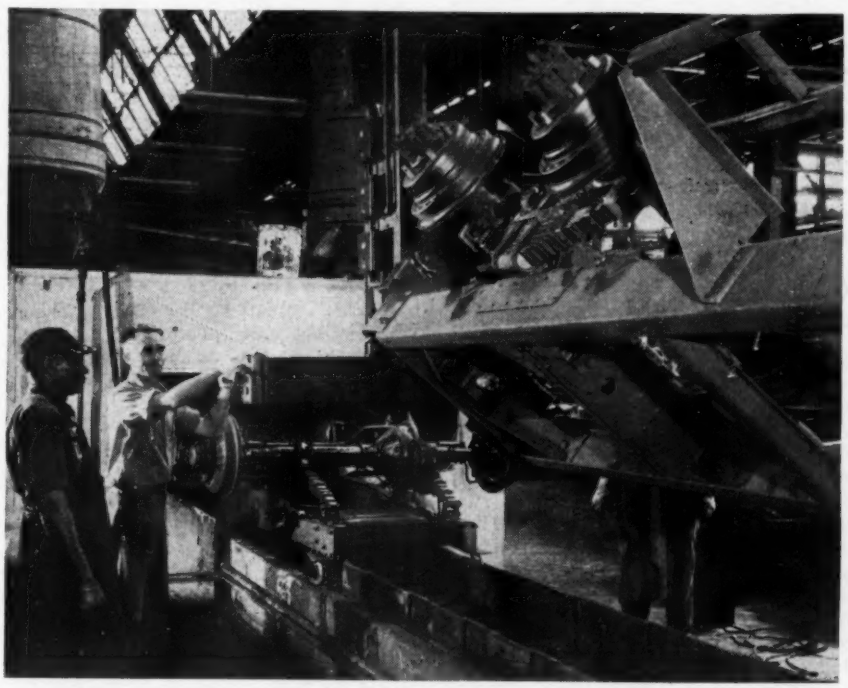
Will Convert War Plants On one vital point the members of the industry seem agreed. A lush retail car market will exist for some time immediately after the war. And each company expects to get its full share of that market. All sorts of wild guesses are being made by statisticians and by mere guessers, but there appears to be some substance to the belief that in the first full year of car production following the war output of cars and trucks will top any figure heretofore reached and likely will be considerably more than 6,000,000 units. The best previous record was 5,300,000 units in 1929. With the conviction that a new high will be set, General Motors is planning its future program on the basis of having available not less than 25 percent more plant facilities than at any time when it was engaged in motor car production. That means that the corporation probably will take over some Defense Plant Corp. factories that it is currently operating provided that the terms will be satisfactory. Though such factories may have been built to produce aircraft or aircraft parts or ordnance, they would be put to work building automobiles.

Packard is as optimistic as General Motors. It intends to use not only its former automotive facilities, but also its present Rolls-Royce Merlin aircraft engine factory for the production of automobiles, counting upon the biggest retail car market in history to keep that increased capacity busy.

Plant Clearance Is A Factor Just because cars might be rolling off assembly lines within two months after the war does not mean that anywhere near full production will be attained that soon. Such speed would be impossible. Two factors more than any others will control the acceleration of automobile manufacture. The first is the prompt releasing of company-owned plants by the government back to the owners. The second is the prompt and proper clearing of plants of inventories of war goods consisting of raw materials and materials partly processed.

Subcontractors Are Important Unfortunately automobile production cannot be done by the release of one or two factories. Manufacture of motor cars is one of the most involved and intricate problems in all of industry. It embraces scores and scores of plants making parts and in general the so-called automobile factories are not much more than assembly stations into which flow parts and subassemblies of all kinds to be put together into automobiles. All of these factories are an integrated part of the industry. Deprived of their facilities, the industry cannot function. That is why it is all-important that the government make available at one time the plant space that makes possible the building of complete automobiles. Partial release of vital facilities will not do much good. From the standpoint of inventories, General Motors today has on hand something like $500,000,000 of war goods in process. That in itself ties up enormous capital and occupies vast spaces.

The first rush after the war will be to produce cars in large volume; and those cars obviously will be 1942 models with a few changes. Radical designs that are talked about in Sunday newspaper supplements and in general magazines will have to wait, except for the possibility that some brash newcomer may venture forth with a new departure that a few brave



Truck Turner—With military trucks being mass produced, Studebaker has drawn from its peacetime production experience, constructed a turnover hoist of sufficient size and strength to handle these heavy duty frames. Frame ends are bolted against horizontal member of the hoist, which lifts and rotates it through 180 deg. and lowers it again to the conveyor

citizens will buy. Car design, as heretofore, is likely to be a matter of evolution rather than revolution. The big companies have too much at stake to pop forth with radical innovations, at the same time scrapping ideas that have been accepted by the public.

To Dress Up 1942 Models Clear apart from the risk involved, which is somewhat like staking a potful of money on one throw of the dice, the time element alone would prevent introduction of complete new designs in cars upon the termination of the war. Such innovations require new machinery that would take a long time to build and they involve new tooling and testing and familiarity with manufacture that cannot be perfected short of many, many months. Neither the country nor the automobile industry wishes the after-war tooling period to stretch over a year or more, because that would result in a demoralizing period of unemployment. The sheer task of getting back into car production with familiar designs will have its full share of headaches.

Will be too Busy to Wander This task alone will absorb all the time, attention and effort of the big companies without their venturing into new fields. The airplane industry, for one, will have little lure. Estimates now are that after the war little more than five percent of aviation-producing capacity will be needed to furnish all the planes that will be ordered. That prospect is hardly attractive to an industry accustomed to thinking of volume in big figures. By contrast, the automobile market should be excellent. General Motors, to cite one case, has no plans whatsoever for putting on the market a private or commercial plane in the first two years following the war.

Await Center Line Fireworks The industry is watching the U.S. Naval Arsenal at Center Line for repercussions on the change from management by Hudson to the Westinghouse Electric Co. The changeover came quietly and with little fanfare on the stroke of midnight Oct. 27.

James R. Weaver and a small band of about 10 Westinghouse executives moved into the front offices of the sprawled out plant several days earlier and prepared to take over the responsibility. No stoppage in production was permitted and not even an inventory taken.

Outwardly, all seemed well. Underneath, a small rebellion was reported brewing. The men, most of them veteran employes of Hudson, had been given releases by their old employers to work for Westinghouse. This was true of the supervisory force as well as the skilled tool and die makers, who make up the backbone of the job shop setup at the arsenal.

James R. Weaver

Would Stay With Hudson As soon as the change was announced on October 6, many of the supervisory force handed in their resignations. They wanted to go back to Hudson, where they not only had built up seniority but had secured places from which to step higher in the organization. While their seniority was guaranteed by Westinghouse, the prestige they had built up with their old employer could hardly follow them.

But shortly before the official shifting of the management to Westinghouse, the key supervisory force was called in by groups and told they were "frozen" and could not resign. Despite their protests about 60 per cent of the supervisory force were told to carry on as usual, that Westinghouse did not have the trained personnel staff to replace them at this time.

What will happen as the result of this "request" for them to stay at the arsenal remains to be seen. If they balk, they must lay off for 60 days before they can go to another job. But observers believe the pressure put on the staff may backfire against the new operating management.

Back to Private Life D. J. Hutchins, regional director of the War Production Board since September, 1942, has resigned his post to return to the Manufacturers Sales Div. of Firestone Tire & Rubber Co. He was given a leave by Firestone a year ago last February to join WPB.

No successor has been named for Hutchins. He succeeded Ernest C. Kanzler when the latter was called to Washington to become chairman in charge of operations for Donald Nelson.

While Kanzler's job was to get the automotive plants going on war orders and to build up the production peak in the plants, Hutchins' task has been more to keep materials moving smoothly into the factories.

Announces Collections Listing his accomplishments in announcing his resignation, Hutchins said: "The regional office has collected more than $75,000,000 worth of scrap materials during the past year and a half, moved more than 3,000,000 tons of iron and steel scrap from dealers to mills. We collected more than a half million tons of scrap rubber."

Hutchins denied that his resignation presaged a lessening or leveling off of war production.

"On the contrary," he stated, "war production is expected to be stepped up during the coming year."

James E. Wilson, priorities chief for the Detroit region, was mentioned as the probable successor to Hutchins but his record on priorities makes it important he be kept in that job.

Hutchins, while not as forceful and colorful as his predecessor, has nevertheless done a good job. He has been working closely with the committee which has been determining if more contracts are to be sent into Detroit or elsewhere and whether present contracts are to be shifted out of Detroit because of the manpower situation.

To Describe Milling at 10,000 Surface ft. per. min.

NEW YORK—New milling practices have stepped up the pace in machining a wide variety of aircraft parts. Speeds unheard of under conventional methods are now attained in everyday operation, with results so startling that they may point the way to widespread revision in ideas on machining for both war and postwar production. Some of the milling speeds currently used in production of aircraft parts run as high as 10,000 surface ft. per min.

A symposium and panel discussion of this development in machining practice will be held under the auspices of the Production Engineering Division, American Society of Mechanical Engineers, on Monday, November 29, 8 p.m., at Hotel Pennsylvania, New York City, during the Annual Meeting of the Society. Data and information on high-speed milling will be presented by H. A. Frommelt, Kearney & Trecker Corporation, Hans Ernst, Cincinnati Milling Machine & Grinders, Inc., A. A. Schwartz, Bell Aircraft Corp., Wallace Brainard, Consolidated Vultee Aircraft Corp., Fred W. Lucht, Carboloy Company, L. W. Kemps, Aluminum Company of America, and Ralph G. Hummer, Defiance Machine Works, Inc. Representatives of other aircraft and milling machine companies will also participate in the meeting.

Survey Chicago for 48-Hour Week; Return to Civilian Output Seen

CHICAGO—Manpower continues to be the top headache of the Chicago area metal trades, although contract termination, renegotiation, and other industry-government problems get more discussion here. The regional office of the War Manpower Commission is now conducting a survey to determine whether Chicago should be placed under a mandatory 48-hour week.

Chicago is still a Group II labor area, but the increasing shortage of workers here forced the WMC to at least consider the longer work week. Some areas in this region, as Calumet, are already in Group I.

Among men in the metal industry here, there is doubt that the 48-hour week would help much to ease the shortage. Chicago has an acute transportation problem, and the longer work week would aggravate it. Meanwhile, statistics released by the state labor board disclosed that employment in the state has gained for the eighth consecutive month, and that the metals and machinery group was one of the leaders, showing an increase in both employment and payrolls.

To Fabricate Aluminum

The Phelps Dodge Copper Products Corporation will soon be operating their new plant at Hammond, which will cover 12 acres under one roof, on property purchased by the DPC from Pullman Standard Car Mfg. Co.

The Hammond plant will produce aluminum and magnesium tubes, shapes and rods, and will mark the first large scale extension of Phelps Dodge fabricating activities into metals other than copper and its alloys.

A number of other Chicago metal working plants have recently launched expansion programs, and it was announced that the total capital investment in new industrial facilities in the Chicago area during the first nine months of 1943 is almost $144,000,000.

Loan to Expedite Conversion

One of the first large "VT" loans was recently approved for the Pullman-Standard Car Manufacturing Co. here, a $60,000,000 regulation credit agreement. The three-year agreement will free the company's own working capital for immediate reconversion to the manufacture of civilian goods upon termination of war contracts. C. A. Liddle, company president, said that Pullman-Standard, through the loan, will be able rapidly to manufacture new freight and passenger cars at the war's end. He said that the new cars will yield substantial operating economies through the use of lighter weight equipment operated at higher speeds.

Production Resumption Seen

The revival by large corporations of regional sales meetings in the Chicago area, and the fact that some of the trade shows here recently have shown a few new items for civilians, have increased interest in the possibility that some of the metal trades, at least, may soon be allowed to produce some consumer goods in addition to their present output.

No one expects the government suddenly to let the bars down, but the shifting emphasis in ordnance production brings the end of the backlog in sight for some companies, and it is possible that a few metal working companies may get the nod to increase their civilian production here soon.

To Make It Hot for Adolph

The largest furnace ever built for the production of shell cases is now on its way to Russia. From 400 to 500 freight cars are required to ship the complete job, engineered by W. A. Darrah of Continental Industrial Engineers, Chicago. Artillery shell cases at the rate of 12,000,000 a day will be turned out by the huge annealing furnace, and more than 4,000,000 pounds of fabricated steel were used in its construction.

Subcontracts Offered

Several million dollars in new subcontracts are being offered in Chicago to manufacturers in this area with facilities for machining malleable castings and forgings and for subassembling operations. The prime contract, for axles and transfer cases, is held by the Standard Steel Spring Company, and subcontractors are being sought.

ELECTRONIC PRODUCTION UP

NEW YORK—Electronic production at a rate of four billions annually now exceeds average automobile volume for the years preceding the war. Increased war demands for devices already in use by the military and development of new devices will require much more production in this line than the present rate. Shortages of certain materials might become a problem in this industry. But the needs are known and steps have been taken to meet them when they come.

Named Executive Head

CLEVELAND—Appointment of W. W. Galbreath as executive vice president of the Pressed Metal Institute is announced by George E. Whitlock of Mullins Manufacturing Co., president of the Institute. Mr. Galbreath was for many years president of Alliance Porcelain Products Co. In his new post, he will devote special attention to Institute postwar problems and planning. The recently organized research division of the Institute will be primarily concerned with opportunities for pressed metal in postwar production, speeding of redesign and conversion. Institute headquarters have been transferred from New York to 829 Union Commerce Bldg., Cleveland.

W. W. Galbreath

Blade Bender — Bent and warped propellers are straightened at flying bases with equipment made by Thomas Machine Mfg. Co. for Curtiss-Wright Corp. The blade is held in a cradle and straightened against a metal block shaped to fit its contour at a station numbered on the blade. Sets of blocks are made to fit the different types of hollow propellers at specific stations on each

Steel Men Gain Confidence from New Facilities, Worry over Scrap

PITTSBURGH — Although keeping their fingers crossed because several factors could upset production schedules, steel men, without doing any boasting, feel that the fight to obtain sufficient war steel is over the hump and the industry is in a more comfortable position in several respects. Since Pearl Harbor, approximately 170,000,000 tons of steel have come out of American mills. As new facilities are placed in operation, production records are set almost monthly, and about 1,800,000 tons of steel are being made weekly, or 7,500,000 tons monthly. Much of United States Steel Corp.'s $700,000,000 war expansion program has been completed; the remainder is expected to be in operation soon.

Alloys Supplies Ample

There will continue to be temporary tightness in specific products, but steel authorities declare there is no longer a shortage of basic steel and there are ample supplies of alloy steel. Customer complaints over steel product deliveries have ebbed, it is reported. The tight situation that prevails in plates and sheets is expected to ease within a few months. It is true that order books generally are filled to mid-1944 on some items, but concrete bars are easier, some carbon and alloy bar sizes are expected to be easier soon, and structural mill space is available. The improved situation is reflected in the War Production Board's reshuffling of ingots and alloy steel so as to keep electric furnaces at capacity.

Worried by Strikes

The steel industry, however, still has its worries. Up to Nov. 1, the series of coal strikes cost approximately 375,000 tons in steel this year, and other walkouts could cut production schedules or create transportation bottlenecks. The growing shortage of labor is another problem, and Patrick T. Fagan, Pittsburgh area manpower commissioner, has warned that drafting of war workers must be reduced more than 60 percent a month after Jan. 1 if the district is to escape being designated as a Class 1 acute labor shortage area. At present, an average of 3,600 war workers are being drafted monthly from the Pittsburgh-McKeesport-New Kensington labor market, but Fagan hopes this will drop to 1,400 monthly after Jan. 1. With Western Pennsylvania shy 15,000 coal miners, Fagan intimates that the Army may be asked to furlough some miners to permit them to return to the pits.

Another fear is that the national scrap drive, which ends Nov. 15, may fail to achieve its goal of building up a scrap inventory of 15,000,000 tons for the last half of 1943, with industrial scrap expected to account for 9,800,000 tons. With mills consuming 4,500,000 tons of scrap monthly, reports at the end of July indicated the nation's scrap inventories totaled 6,800,000 tons, a two percent drop from June. While the scrap inventory figure isn't alarming, it fails to reveal the maldistribution in present supplies. East of Pittsburgh, mills are reported well stocked but at Youngstown, O., Chicago, and St. Louis, consumers are not so fortunate.

Other discouraging factors in the scrap picture are the slight downward trend in the amount of railroad, automotive, and manufacturers scrap; the fact that the Great Lakes movement of iron ore this season will be only about 86,000,000 tons compared with 92,000,000 tons in 1942; and the record steel operating rate that demands more scrap. The public's apathy to the drive may stem from the fact that no advertising "kitty" was provided this year as last year when the steel industry and scrap dealers put up a $2,000,000 advertising fund, and newspapers, suffering from a shortage of newsprint, are unable to give so much free publicity. While the 1942 drive netted from 3,000,000 to 6,000,000 tons, this year's scrap campaign will be considered a success if half as much is gathered. Illustrating the poor return is the report of two New York boroughs which contributed on the publicized day of salvage this year 97 tons compared to 19,000 tons a year ago. Battlefield scrap is arriving in this country at the rate of 20,000 to 25,000 tons a month—only a drop in the bucket. So most of the scrap in the 1943 drive must come from the farm and factory, and industrialists are urged to chuck into the scrap pile old die sets and those machines moved out to make room for war production.

BRASS FROM STEEL MILL

PITTSBURGH — Weirton Steel Co., at Weirton, W. Va., became the first firm in the country—perhaps in the world—to roll brass on steel mill equipment in response to a government search for more rolling capacity for shells and cartridges. After solving problems of working to such a thin gage and the tendency of the brass to curl around the rolls and dip between the table rollers of the mill, Weirton is rolling about 50,000,000 pounds of brass a month. In the Weirton plant, brass slabs are hot rolled on a structural mill which reduces the brass from about 4½ inches to ½ inch. After being "skinned" or machined, the brass then is sent to the cold strip mill to be reduced to the desired gage.

89,500,000 Ton Steel Output Seen for 1943; Ore Margin Slim

WASHINGTON — War Production Board officials are now expecting a total steel output of 89,500,000 tons for 1943, as compared with estimates of about 91,500,000 tons being made about six months ago. Reasons for the lowered sights are two: (1) Delays in completion of new steel projects; and (2) Sporadic strikes.

The successive paring of 1943's expected steel output, which once was placed as high as 93,000,000 tons, has helped to relieve pressure on the ore movement down the Great Lakes. Due to unfavorable weather and lack of aid by Canadian ships (which were diverted to ocean duties), the movement has lagged and officials here expect that the season will do well to wind up with a total movement of 86,000,000 tons of ore down the Lakes. This will mean that the steel industry may come through the winter with about 60 days' supply of ore on April 1, 1944, by which time the 1944 shipping season should be open. But this average figure for the industry is expected to mean that some companies may actually draw down their stocks to a couple of weeks' supply. Because of this, WPB plans to leave a large supply of ore right at the Great Lakes unloading docks, so that it may be moved later on to those furnaces needing the ore most urgently.

Fortunately, there currently is a surplus supply of pig iron, which could be drawn upon if ore shortages actually closed any blast furnaces. However, the surplus pig iron may be whittled away if the steel industry's scrap drive fails to bring out enough scrap. Lack of scrap would force the usage of a higher iron ratio, so that this surplus might not be available next spring.

Meanwhile, electric furnace steel continues to be a problem with WPB pushing its use instead of open-hearth alloy steel. Some observers believe that several of the new electric furnaces now nearing completion may be idle because of lack of orders for electric furnace alloy, due to $10 a ton higher cost than open-hearth alloy.

Wartime Washington

Legislation to speed up cancellation claim draws nearer. Congress may pass law for prompt payment of 75 percent of corporate tax "carryback" refunds. Deal to produce more machine tools for British not closed. Battle bearings bottleneck

Cancellation Agency Seen

Congress is moving toward passage of legislation designed to permit speedy settlement of contract cancellation claims, but compromising on provisions requested by industry, the contracting agencies, and the Office of the U. S. Comptroller General. Industry will be granted its request for some form of prompt and final settlement of the bulk of the claims with a single federal agency, and some provision will be made for financial assistance on the unsettled portion of such claims.

Limited Power For Comptroller

The Comptroller General had requested absolute final power over settlements, which, in effect, would have meant that each claim would be subject to two settlements: first by the contracting agency, and then by the comptroller general. This procedure would have impeded postwar reconversion of industry, and cost the government considerable expense for the tremendous amount of accounting work that would be entailed in checking invoices, checks, inventories, and so on, on thousands of claims involving billions of dollars. Instead, the comptroller's office probably will be permitted to make a somewhat less detailed check, which would safeguard the government against fraud. At the same time, the contracting agency through its representative officers, most familiar with each contract, would make the necessary initial negotiation.

Industry representatives were also vitally interested in the proposal of the U.S. Treasury that Congress pass legislation permitting industry promptly to secure payment of at least 75 percent of its postwar "carry-back" claims; this would operate under tax law provisions enabling industry to claim a refund of its war taxes in the event it suffers heavy losses in the postwar years. The treasury admits that under normal procedure such claims would pend for several years until the tax statements substantiating them could be checked.

Moreover, congressmen are studying the large surpluses already being accumulated by Federal Agencies, and fully appreciate the threat they constitute to normal industrial markets.

Recovery Corp. Ends Activities

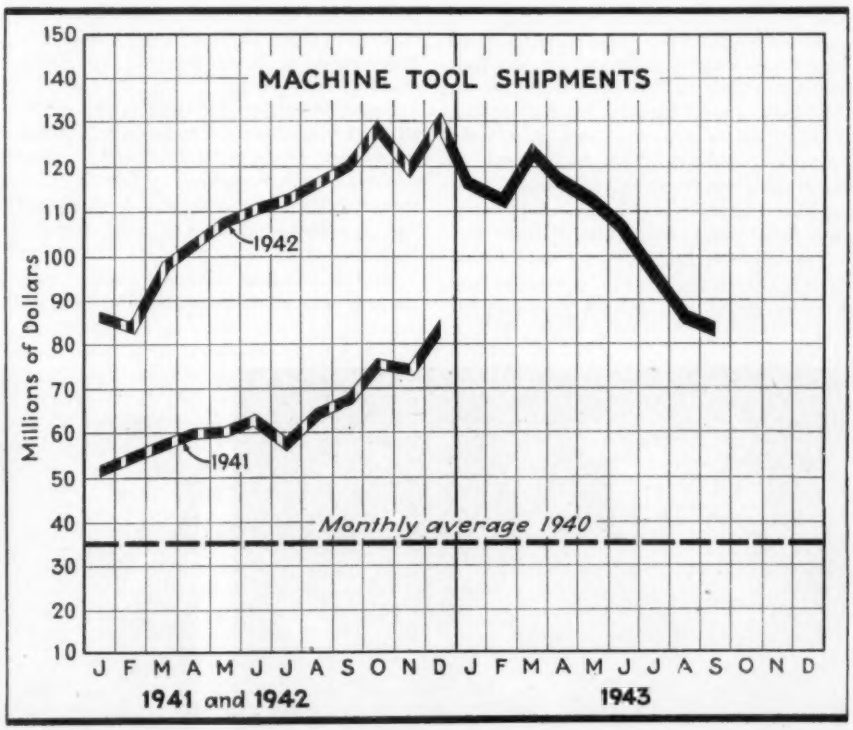
The wind-up of the Steel Recovery Corp. on Novemebr 1, revealed that this Federal-controlled unit had successfully liquidated some 450,000 tons of steel which had been "frozen" in inventories as a result of various Federal regulations. Of this total only 54,000 tons had to be remelted as scrap, while the balance was put into industrial use after some reworking and reprocessing. From now on, the Steel Division's surplus inventory branch will carry on the work with the aid of WPB's regional offices.

Seek to Ease Bearing Jam

WPB's Tool Division is working on a multi-pronged campaign to ease the bottleneck in anti-friction bearings. Besides conducting a drive to try to borrow some bearings out of inventories (as was done recently in the case of steel valves), and attempting to standardize production of certain types and sizes to particular manufacturers to help speed output, it is actively aiding bearing makers to secure badly needed manpower and is also carefully screening new orders for bearings in the light of actual requirements. WPB officials believe that the chances of breaking this bottleneck are good.

Pool Tools Stored

Machine tools produced against pool orders are being stored both in privately-owned and DPC-owned warehouses. No progress has been made along the suggested lines of substituting some other type of "pool" orders for the industry's present backlog. Nor have arrangements been closed with the British to supply the bulk of the United Kingdom's machine tool needs, so that British workers can be diverted to other industries badly short of manpower.



Leveling Off—Shipments of machine tools declined but 3.2 percent from August ($87,405,000) to September ($85,842,000), as compared to a 10 percent drop from July ($97,541,000). This moderation of the downtrend may stem from the reduced rate of cancellations. However, the low level of net new orders after cancellations continues to draw down the industry's backlog. At the end of September, unfilled orders totaled $333,119,000 or 14 percent below the August-end total of $386,792,000. Net new orders for September amounted to $31,759,000, as compared with $33,524,000 in August, and $28,795,000 in July

New Materials and Equipment Shown at Metal Congress

Shorn of the frills, the War Conference was effective in its business-like simplicity. New trends and improvements noted in many fields of metal working

CHICAGO—The 25th National Metal Congress, October 18-22, differed from its predecessors in that the elaborate showmanship of exhibit booths gave way to an almost puritanical simplicity in the War Conference Displays in sample rooms on three floors of the Palmer House. What was lost in dramatic presentation was made up by the earnestness shown between production men seeking better methods for increasing wartime output and makers of materials and equipment with new ideas to offer industry. The display rooms were virtually free from casual sightseers. As in past years, the Congress was sponsored jointly by the American Society for Metals, the American Welding Society, the Wire Association and the American Institute of Mining and Metallurgical Engineers.

More Induction Heating

A notable trend was that toward wider application of induction heating. The Ohio Crankshaft Co., a pioneer in this field, introduced a 7½-kw. model of the Tocco Jr., designed primarily for tool brazing. The equipment is made in two parts so the work unit may be mounted on a table top, separate from the power unit, if desired.

The Illitron, presented by the Illinois Tool Co., is a high-frequency induction heating equipment which provides for "rematching"—that is, the power output of the generator is automatically adjusted to the changed impedance of the workpiece when passing through the critical temperature. A great increase in heating efficiency is claimed for this control.

A line of induction units, ranging up to 30-kw capacity, was shown by Lepel High Frequency Laboratories, Inc. Using the spark-gap method for producing 150,000 to 300,000 cycles per second, this equipment is suitable for heat-treatment, stress relieving, brazing, soldering and melting.

Electronic Control Used

The Megatherm Process, displayed by the Federal Telephone and Radio Corporation, uses electronic tubes to obtain from one to fifteen million cycles per second. With these frequencies more accurate control of case depth is claimed in hardening; applications to non-magnetic materials are also possible in this range.

Budd Induction Heating, Inc., exhibited equipment for hardening internal diameters of both cast iron and steel parts. A low-frequency induction unit, shown by Electric Arc, Inc., is designed for pipe bending, annealing and stress relieving.

In the welding field an outstanding display was that of the Nelson Specialty Welding Co., which introduced a new light-weight stud welder. This tool welds a steel stud perpendicularly to a steel plate in less than half a second. The new model "H" gun is made of rag plastic and is entirely automatic in operation. It is extensively used in shipyards.

Eutectic Welding Alloys Co. displayed a wider variety of "low temperature welding" rods and flutes than in previous years. The line now includes materials for joining virtually all kinds of commonly used metals.

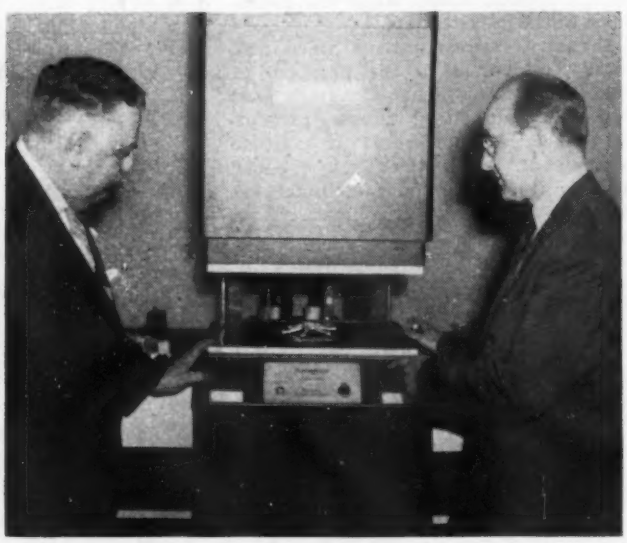
Welding Machinery Shown

A 500-lb. capacity welding positioner, shown by the Ransome Machinery Co., is provided with a Worthington All-speed drive, which gives a rotary table motion based on an eighth to double the motor speed. Power tilting action is also included.

The displays reflected progress in the field of inspection. One of the most novel of the new devices was the Cyclograph, offered by the Allen B. DuMont Laboratories, Inc. Variations in composition, diameter, thickness and plating, case depth, heat treatment and other properties affect the shape of a visible pattern shown on a cathode-ray tube indicator screen. Among the demonstrations of this instrument was the automatic sorting of copper-clad bullet cups according to the thickness of the copper.

Sperry Products, Inc., showed a flaw detector for ferrous and non-ferrous tubing and bar stock. Splits, seams and inclusions, invisible to the eye, are discovered electrically and indicated by a signal lamp.

Ted Nelson came from San Leandro, Calif., to demonstrate his new stud welder. Bent studs were beaten with a hammer; the thread failed before the weld



C. Eason and E. F. Moran, Westinghouse, view with pride their company's new unit for the X-ray inspection of small parts in production lots. Use of 35 mm. film cuts cost

A fully inclosed X-ray unit for production work was shown for the first time by Westinghouse Electric & Manufacturing Co. It is particularly suitable for small parts such as die castings, aluminum forgings and powder metal components. Use of miniature film cuts X-ray costs to a tenth of previous practice.

Federal Products Corp. showed a number of new measuring devices. Among them were a small snap gage reading to ten thousandths of an inch, a bore gage for measuring internal diameters as well as squareness and runout, and a micrometer comparator, accurate within 0.00002 in.

The Comparitrol, a precision gear indicator, was presented by the George Scherr Co. Gears are revolved on this instrument while runout is shown on a precision indicator gage.

A unit for bringing parts to 120 F. below zero for shrinking, testing and treating was exhibited by the Deepfreeze Division, General Motors Corp. Quenching to this low temperature may open a new field in the heat-treatment of steel as the austenitic structure can be reduced to a much lower percentage than ordinarily.

Cutting with Abrasives

The Andrew C. Campbell Div., American Chain & Cable Co., is offering a new rotary bar cutter capable of handling up to 12 in. diameter in aluminum and about 9 in. in steel. The work is oscillated and rotated while an abrasive wheel makes the cut.

Roto-Finish, a barrel tumbling process, was presented by the Sturgis Products Co. The wet process uses granite chips with a water soluble compound to produce a bright finish on metal parts at low cost. The dry process tumbles the work with limestone.

A new oil-treatment unit, made by Sparkler Filters, reconditions grinding and honing compounds. The oil is heated before filtering to keep sulphur, lard and other additions in solution.

Firth Sterling Steel Co. displayed some of its tool materials designed especially to conserve critical alloys. A high-speed steel and two die steels, one for hot and one for cold working, have compositions which save tungsten and vanadium.

Carbide-tipped, Meehanite-body tools were shown by McKenna Metals, Inc. This concern also exhibited carbide burrs designed to run at 20,000 r.p.m. and said to give remarkable tool life.

Tube Turns, a division of the Girdler Corp., had an exhibit of forgings, both dural and steel. Of particular interest was the new forged aluminum alloy aircraft engine head.

Copper base and Hytensil aluminum castings made by the plaster mold process were featured by the Universal Castings Corporation. In the display were some fine precision parts finished in the "as cast" condition.

George Scherr included a novel gear indicator in his exhibit of precision measuring instruments

R. J. Southwell, Campbell Div., American Chain and Cable Co., told the merits of abrasive cutting

Awards Attendance Pins

SEATTLE—Seventy-five Western Gear Works employees—who had lost no time for any reason—were presented with sterling silver perfect attendance pins by Thomas J. Bannon, executive vice president and general manager, during the ceremonies attendant upon the renewal of the Army-Navy "E" flag. Those who maintain their attendance records for another year will be presented with gold pins, it was announced. Western Gear has one of the best attendance records in the Puget Sound area, it has been announced, generally being approximately two and one-half percent above the average for the region.

See Postwar Competition For Detroit, Pittsburgh

CHICAGO — That old controversial topic—the postwar rivalry of Chicago for at least a large slice of Detroit's automotive production—became active here recently at several meetings of automobile manufacturers. It seems reasonably certain that the postwar plans of major automobile companies and some of the others contemplate continued employment at their Chicago area plants at present levels—at least when peace comes.

Anticipate Easy Deal

One of the big "ifs" of course is the government's policy in the disposal of Defense Plant Corporation properties, but very few persons actually expect that the government will drive too hard a bargain for the plants after the war. It was learned recently that General Motors expects to add some units —including a foundry—to the Buick-Melrose Park plant after the war, if the plant is taken over from the DPC.

It has been said that a number of the top automotive engineers have recently come to Chicago to work, with the intention of remaining here after the war.

Another factor that may influence some postwar decisions is the great wartime increase in Chicago area steel capacity. Some persons believe that total capacity here after the war may offer Pittsburgh serious competition.

AND NOW, ANOTHER ANGLE!

PITTSBURGH—A unique weapon was used by the C.I.O. United Steelworkers of America in its campaign to organize employes of the Mesta Machine Co., of West Homestead, Pa., when the union brought a million dollar suit in the Pittsburgh federal court charging the company underpaid its employes for overtime work. The union accuses Mesta of violating the federal Wages and Hours law by allegedly failing to include incentive bonus earnings of the workers in computing time and a half payment for work over 40 hour per week. The sum of $500,000 is sought in underpayments purportedly due union members, while an equal amount is demanded as liquidated damages as provided by the Wage and Hour law if time and a half is not paid on the proper basis. Since 1937, the union has sought unsuccessfully to obtain a collective bargaining contract with Mesta.

Postwar China to Emphasize Shift To Industry; Now Buys Machinery

NEW YORK—China will definitely seek to industrialize her economy after the war, but it is unlikely that her policy will lean toward a drastic forced program to be accomplished in ten, twenty or thirty years. Industrialization of China will be similar to that in Russia in one aspect only, according to informed sources, in that time will be necessary. Because the country is still steeped in centuries of tradition, it is temperamentally unfitted to do a thorough job in a stated period. And it is questionable whether the natural resources are available.

Government Program Seen

China's postwar policy has not been revealed by its government. Nevertheless, it appears certain that government will take upon itself the planning, financing and management of public utilities, road building and irrigation projects immediately after the war. A very small steel industry now exists and may be built up to some extent if deposits of ore, coal and limestone can be worked economically. Manufacture of heavy machinery and machine tools is unlikely because of the technical difficulties involved.

Industry for Defense

After seven active years of war, China realizes she must become industrialized, at least to a limited extent, as a means of future self-protection. However, she has no hope of ever reaching the standard of living enjoyed in America, because of lack of natural resources and a huge population. Any industrialization program that is put into effect will seek a more balanced economy by shifting part of the population from predominately an agrarian life. And some exports of manufactured goods—textiles, small articles—are deemed necessary to obtain foreign exchange to offset heavy borrowings from abroad.

To Stress Heavy Industry

Imports of textiles, food, tobacco, petroleum products may be curtailed by the Chinese when peace returns, and the emphasis placed upon heavy machinery and machine tools with which to establish certain types of manufacture. Chinese textile men are now in this country investigating knitting equipment and fibers, others are looking at machine tools and manufacturing processes in metal-working plants. On the whole, though, the shipment of equipment to China is only a trickle at present.

Although the Chinese government must seek to control industry under war conditions, regimentation is not possible because of the nature of the people. Such controls as do exist will probably continue for some time after the war to prevent chaotic exchange conditions. However, prewar restrictions upon foreign private enterprises are to be relaxed. Resolutions passed by the legislative body call for a broader policy of cooperation with foreign governments and firms. It will no longer be necessary, for example, that stock control of a company rest in Chinese hands, or that a Chinese be the manager. On the other hand, new emphasis will most likely be placed upon observances of Chinese laws, customs and business regulations by foreigners. Much further work must be done in China before these principles can be put into operation.

Makes Long-Range Plans

The reconstruction and industrialization of China will not get under way over night when war ceases. The policies of the United States and other United Nations with respect to large credits and disposal of surplus equipment have not been formulated. But China has her ear to the ground. Over 1000 students are receiving practical engineering training in foreign countries and it is hoped to augment this number 50 percent in the near future. Business men and technical experts are in this country checking the possibility of postwar light manufactures. And it may be suspected China will throw a potentially large future import trade to those countries which see fit to extend large credits.

Trade Policy Clouds Post-War Prospects For Canada

OTTAWA — Canadian manufacturers find themselves condemned to indefinite uncertainty regarding their post-war prospects at home and abroad because Ottawa has hitched its post-war trade kite to an international plan of multilateral trade agreements and tariff ceilings. A large percentage of the Canadian companies whose future is at stake are subsidiaries of parent United States firms manufacturing automobiles, radios, electrical appliances, stoves, washing machines and agricultural machinery.

Prime Minister Confirmed

This drift of Ottawa trade policy has been anticipated but was not openly acknowledged until Canada's proposals on international monetary exchange were submitted to the United Nations a few months ago. Late last month it was confirmed by statements of Prime Minister Mackenzie King and his parliamentary assistant, Brooke Claxton, M.P., to the Foreign Trade Convention in New York, which went a step further with a bid for an international agreement on tariff ceilings.

The imediate effect of this is to give an interim negative answer to demands of Canadian industrialists for assurance of the reestablishment of tariff protection in the home market at the war's end and retention of Empire preferences under the Ottawa trade pacts of 1932. If war-end settlements open the way to multilateral trading and all around lowering of tariffs, Canadian manufacturers may be told to adjust themselves to a new system of freer world trade.

Set Up Canadian Branches

Many U. S. companies established Canadian subsidiaries after the Empire trade agreements were made in Ottawa in 1932, in order to gain access to the markets of Great Britain and the dominions under the new preferences. Under Canada's general tariffs they were assured at the same time of advantages in the domestic market against competition from U. S. mass production plants.

Auto Trade Lost

Even without Ottawa's swapping of Empire preferences for the benefits of multilateral trade agreements the Canadian automobile industry was becoming reconciled to the loss of its rich pre-war markets in other dominions. Australia and New Zealand and even South Africa have been obliged to develop extensive war plants to meet their war needs and these will very largely be converted to the production of civilian goods after the war. Australia has also developed some machine tool plants which can equip it for output of agricultural and other machinery. Prospective compensation for these losses by Canada is seen in larger markets in the Empire countries for refrigerators, washing-machines, electrical and other household appliances. But if the Empire agreements are scrapped Canadian manufacturers will have to compete in these markets with U. S. industry. If tariff ceilings are lowered they will have outside competitors.

OPERATIONS COUNCIL FORMED

WASHINGTON — An operations council to discuss possible solutions to important problems and bottlenecks in the war effort has been formed by the War Production Board. Meeting bi-weekly, the Council is made up of WPB regional directors, directors of important WPB divisions, and directors of various Washington bureaus. It apparently has been in existence since mid-September.

Spotting The Air News

Navy carrier program will speed blow at Japan. Auxiliaries are all conversion jobs. Projected super carriers to launch, receive B-25s. Next war won't use carriers. Helicopters have rabid friends and foes. Light air-cooled auto engine developed

Three 45,000-ton aircraft carriers to be built by the Navy will not be ready for two years, one in three years. Meanwhile the carrier program has gone ahead incredibly fast. By new year Navy will have nearly as many flat-tops as it has battleships, plus two or three score of auxiliary escort carriers. Few people realize that enough national energy has been switched to fleet carriers to build one a month. This rate will be doubled in 1944, and almost any desired number of auxiliaries can be produced. Thus, even without the new behemoths just projected, the Navy is in a position to strike massive blows at Japan with its air arm alone. To that of course will be added the air power of the British Navy besides the RAF.

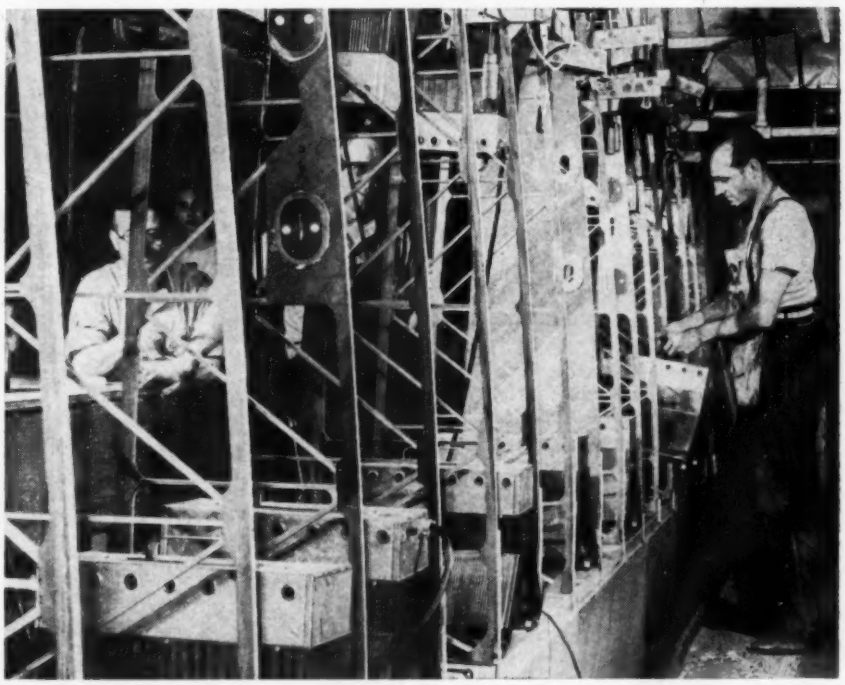
Six months after Pearl Harbor the Navy had only five auxiliary carriers. These escorts are mostly converted from standard C-3 merchant ships, some from tankers. They accompany convoys, deliver short-range airplanes to flight distance from land, and support invasions, as at Sicily and Salerno. Most officers do not think they can serve as trainers for regular fleet carrier crews, or participate in fleet combat. They carry ten or fifteen planes with fuel and shop services. By May, 1942, Navy had programmed 20 more for that year and 24 for 1943. In addition, the Maritime Commission has an additional auxiliary carrier program contracted with Henry J. Kaiser on the West Coast. None of these is in service as yet. So far, all auxiliaries are converted ships; none is built from the keel up as a carrier. In a C-3 only a few changes in design are necessary to accommodate the hangar deck and the flight deck.

The three super carriers will be the biggest war ships in the world. U. S. battleships under construction displace 45,000 tons but the carrier dimensions will be greater. Flight decks will be more than 1000 feet long. The carriers will have more speed, more range, more airplane capacity, more armament, and some armor. (Carriers ordinarily have thin hulls, like destroyers and merchant ships.) They will have more services of all kinds and will come nearer than ever before to serving as complete air bases. They will carry—launch and receive—two-engined bombers larger than the B-25s which the Hornet fired at Japan but could not take back. It is probable that they can launch four-motored heavies, like the B-17, but would be unable to receive them.

This war will be the only carrier war, many airmen believe. None was used in the last war. In the next, if any, land-based planes will have achieved long enough range to take them to any objective. The farthest point on the globe from any given point is 12,500 miles, and the new Boeing B-29 is only a few jumps from that requirement now.

A wind-mill tilt, not of the Don Quixote kind, is in the making. Several gilt-edge aerodynamists lately have warned that helicopters will take years to perfect. They remind you of what happened to the autogiro, after everybody went wild about it. "God save the helicopter from its friends," they say. At the same time, Igor Sikorsky, who has advanced the direct lift machine farther than any one else and has sold them to the Army, tells the Civil Aeronautics Board he is ready to build 14-passenger 'copters for the Greyhound Corporation in 2½ years. This proposed machine would gross 13,000 pounds, carry 4300 pounds disposable load. A 70-foot rotor would be turned by two 600 hp. engines, giving a speed of 100 m.p.h. Authorities believe the helicopter will arrive on a mass basis; they are divided into long-time and right-now schools.

Lycoming announces development of an air-cooled automotive engine of 162 hp. weighing 755 pounds complete with blower, clutch, and fly-wheel, all in a self-contained unit. It was designed for submerged, enclosed war work. There are six cylinders in two banks 180 degrees opposed. Power rating is at 2800 r.p.m., on 73 octane gasoline. Company says it is suitable for trucks, buses, and helicopters, not mentioning automobiles, and that it weighs one-third as much as existing power plants of comparable output. Half of the air from the blower is used for cooling and the rest supercharges (above atmosphere pressure) the carburetor.



Wings for the Invasion Armada—Infra red ray lamps are used by Weber Showcase Co. at their Los Angeles plant to cut to 90 minutes the drying of glue which holds ribs to spars in the wings they are building for CG-4A gliders. It is understood the number of gliders built and a-building—a closely guarded military secret—would surprise, not comfort the Axis

Central Renegotiation Board Set Up, but Legislation Still Pends

WASHINGTON — To centralize renegotiation of war contracts, six Government agencies have set up a joint price adjubstment board, headed by Joseph M. Dodge, chairman of the War Department's price adjustment board. The agencies involved include the War Department, the Navy Department, the U. S. Treasury, the Maritime Commission, the War Shipping Administration, and the Reconstruction Finance Corp.

Power is Delegated

The head of each agency has delegated authority to the board to: (a) formulate and adopt statements of purposes, principles and interpretations to be binding on the departments; (b) apply jointly exemptions relating to natural deposits of minerals, oil or gas, or timber; (c) formulate standards for the exemption of general types of contracts; (d) determine whether any contractors shall have to renegotiate for any fiscal period the contract price under some or all of his contracts subject to renegotiation under the statute; (e) assign any contractor to any department to determine whether excessive profits have been or may be realized from some or all of its contracts subject to renegotiation; (f) prescribe the form and details of the financial statements contractors may file, the manner of giving the notice to which they are entitled to determine the period of limitation after which their contracts cannot be renegotiated.

Besides Mr. Dodge, members of the board include Kenneth H. Rockey, chairman of the Navy Price Adjustment Board; Thomas W. Woodward, chairman of the Maritime Commission price adjustment board, who will also represent the War Shipping Administration; Capt. Harry C. Maull, Jr., chairman of the Treasury Department Price Adjustment Board; Charles T. Fisher, Jr., chairman of the RFC Price Adjustment Board, and Carman G. Blough, War Production Board representative.

While the new board will help to standardize renegotiation procedure, new legislation is awaited to determine the war contractors rights and recourse from certain renegotiation. A measure along such lines has been before the House Ways and Means Committee for several weeks, and should reach the floor of Congress in the near future.

Steel's War Role Told

WASHINGTON — The Steel Division is completing a record of the job that had to be done in steel when the war started and how it was accomplished. This material is expected to be published in the near future.

Practical Jokes Impair War Output and Cause Accidents

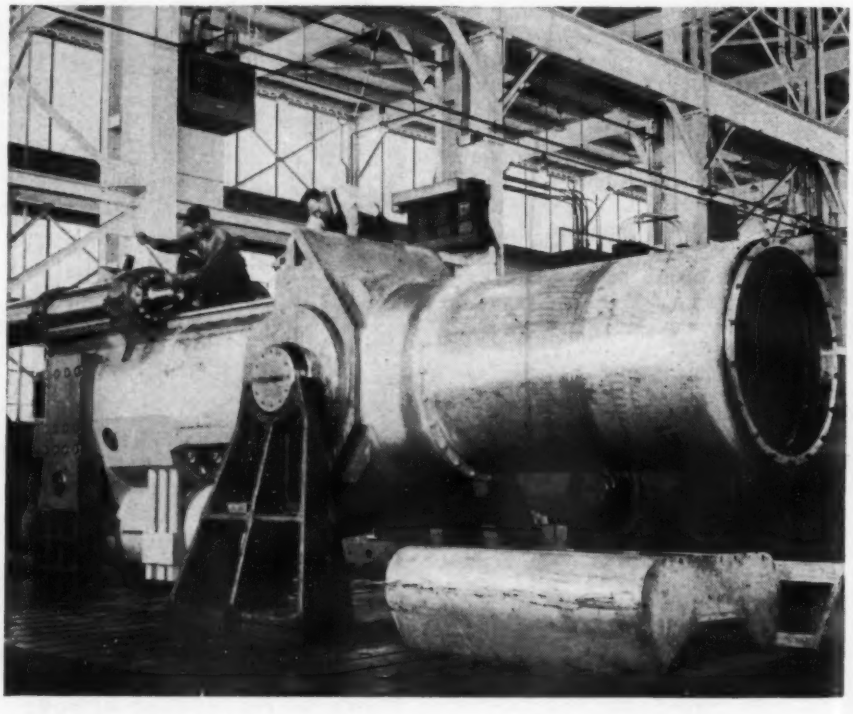
WASHINGTON — Aggravated horseplay and practical joking more seriously impair our war production than does sabotage, according to inquiry by the Federal Bureau of Investigation into thousands of plant accidents. Since January, 1940, the FBI has investigated 11,534 cases of reported sabotage. Less than 10 percent of these yielded evidence of possible sabotage. In only a handful of the 485 cases of persons convicted under the Federal sabotage and related statutes was there any deliberate attempt to impede the war effort. In most instances offenders were motivated by personal anger or spite toward a superior.

Pranks Injure Workers

Ill-advised "prankishness," however, has resulted in the loss of thousands of hours of production. Several workmen in a shipyard at Richmond, Calif., were severely burned by mustard oil placed on them by a fellow workman as a practical joke. In the same shipyard a crew had been "having fun" by putting hot welding rods and lighted cigarettes in each other's pockets. Investigation of a fire in a Detroit plant revealed that employees frequently amused themselves by placing pieces of smoldering string on a workman's shoulder. One employee admitted striking matches and dropping them into a cardboard box soaked with oil.

TO HOLD WAR OUTPUT RATE

PITTSBURGH—Under reconversion plans completed by Westinghouse Electric & Manufacturing Co., civilian products will be coming from Westinghouse's 25 principal manufacturing divisions within a few months after war's end. A. W. Robertson, Westinghouse chairman, revealed that the reconversion plans aim to keep the company's expanded production capacity occupied after the war, as far as possible, so as to provide work for its present 106,000 workers—more than twice the 50,000 employes of pre-war days. Westinghouse's reconversion problem is simplified, Robertson believes, because about 75 per cent of war equipment it is manufacturing is standard apparatus or modifications of such apparatus needed in peace or war.



Cannon Clasp—Itself resembling a giant cannon, this 25-ton mass of precision-finished steel is the stationary housing for the recoil mechanism of a 16-in. Navy gun. To insure perfect operation, this huge forging is machined in some places to three thousandths of an inch tolerance

NAMES in the NEWS

John Hauerwaas, newly appointed president of United States Steel Products Co., 30 Rockefeller Plaza, New York, N. Y., formerly Boyle Mfg. Co., has announced the appointment of several executives to handle operations of the recently acquired plants in this

U. S. Steel Products Appointments

T. McGahan

A. E. Klieves

John Hauerwaas

J. A. Connelly

W. I. Hanrahan

U. S. Steel Corp. subsidiary. The plants previously operated by Boyle Mfg. Co. are now operated by the Boyle Mfg. Div. of U. S. Steel Products Co.; while the plants acquired from the Petroleum Iron Wks. Co. near Sharon, Pa., and at Beaumont and Port Arthur, Tex., are now operated by Petroleum Iron Wks. Div. of U. S. Steel Products Co. T. McGahan has become vice president and general manager of sales, and A. E. Klieves, vice president in charge of operations of the Boyle Mfg. Div. At the same time, J. A. Connelly has been appointed vice president and general manager, and William I. Hanrahan becomes vice president of the Petroleum Iron Wks. Div.

Edward J. Burnell, heretofore vice president and general manager in charge of Pershing Road plant operations and central division sales of Link-Belt Co., had been transferred to the executive office of the company in Chicago as vice president in charge of sales for the entire Link-Belt Co. Directly assisting Mr. Burnell will be Nelson L. Davis, sales manager for materials handling machinery; William H. Kinkead, sales manager for power transmission machinery; and C. Walter Spalding, sales manager for power transmission equipment. Harold L. Hoefman, manager of the Atlanta plant, succeeds Mr. Burnell as general manager of the Pershing Road plant; while Richard B. Holmes, district manager at Indianapolis, has been named manager of the Atlanta plant. David E. Davidson becomes district manager at Indianapolis.

Wallace K. Brown, former vice president in charge of procurements for Crocker-Wheeler Electric Mfg. Co., has been made manager of the New York district sales of the Crocker-Wheeler Div. of Joshua Hendy Iron Wks. Mr. Brown has been associated with the company since 1908 and has been district manager in San Francisco and Newark and eastern sales manager in New York.

John M. Demarest, consulting and plant engineer for the past 25 years, and recently associated with WPB in charge of aircraft plant expansions, has been named plant manager of Wright Aeronautical Corp. plants in the Paterson, N. J., area. Mr. Demarest became connected with Wright eight months ago as assistant to the general superintendent, and was formerly plant engineer of International Business Machines Corp. from 1932 to 1941.

Paul E. Floyd has returned from his post in the Iron & Steel Branch of WPB at Washington to resume his former position as district manager in the Chicago branch office of Allegheny Ludlum Steel Corp.

Peter L. Lenz has been appointed manager of the Middle Atlantic district manufacturing and repair department of Westinghouse Electric & Mfg. Co., making his headquarters in Philadelphia. Mr. Lenz was formerly manager of the Homewood manufacturing and repair plant at Pittsburgh. His new duties include general supervision of the two manufacturing and repair plants in Philadelphia, one each in Wilkes-Barre, Pa., Huntington, W. Va., and Baltimore.

W. B. Merriam has been advanced from general manager to executive vice president of Globe Products Mfg. Co., Los Angeles. Prior to joining the firm in 1942, Mr. Merriam was vice president of Ruth Dredger Mfg. Co. in southern California.

Advanced at West Coast Plants

W. B. Merriam

P. R. Jordan

Paul R. Jordan, general manager of Harvill Corp., Los Angeles, was elected vice president and general manager at a recent meeting of the board of directors. He will continue as general manager of the company.

M. N. Trainer has been made first vice-president of American Brake Shoe Co., New York, N. Y., producer of railroad supplies and many other products. Mr. Trainer has been a vice-president of the company since 1933, and president of the Brake Shoe & Castings Div. since 1939.

C. V. Topliffe has become manager of the Boston office of Cutler-Hammer, Inc. He started with the organization in 1924 at the main plant, and was later transferred to the sales staff.

Frank H. Carman assumes the position of general manager of Plastics Materials Manufacturers' Assn., Washington, D. C., the first of next year. He has been WPB in that city since 1941, and was previously connected with Armstrong Cork Co.

Harvey A. Craig has been named district sales manager of Republic Steel Corp. in the Los Angeles district. For many years Mr. Craig was vice president of Rheem Mfg. Co., Richmond, Calif.

Frank H. Harrison, manager of manufacturing for International Harvester Co., and E. J. Harrington, coordinator of planning, production and material problems for Lockheed Aircraft Corp., have been named vice presidents of Curtiss-Wright Corp. For the present Mr. Harrison will make

Vice Presidents at Curtiss-Wright

F. H. Harrison

E. J. Harrington

his headquarters at the Curtiss-Wright plant at Columbus, Ohio, and will be in charge of operations. Mr. Harrington, temporarily assigned to the Columbus plant, will be located at the New York office of the corporation as a member of the executive manufacturing staff.

L. H. Atkinson

Luther H. Atkinson has been named vice president in charge of sales of the Elastic Stop Nut Corp. of America, Union, N. J., manufacturer of lock nuts, according to an announcement by William T. Hedlund, president of the company. Mr. Atkinson was formerly vice president in charge of marketing for the Weyerhaeuser Sales Co. of St. Paul, Minn.

BUSINESS ITEMS

Allegheny Ludlum Steel Corp., Brackenridge, Pa., has acquired the Carbide Alloy Corp. of New York City and will operate it as a Carbide Div. This move expands the company's activities in the carbide field. Initial products of this new manufacturing division will be a line of cemented carbides, produced under processes established by Carbide Alloy Corp.

Westinghouse Electric & Mfg. Co., has announced the transfer of all heavy-duty air conditioning and industrial refrigeration manufacture from its E. Springfield, Mass., works to the Jersey City, N. J., plant of Westinghouse Electric Elevator Co. Ross Rathbun has been named manager of air conditioning, and Walker G. White succeeds Mr. Rathbun as general sales manager of the elevator company. Lighter air conditioning, commercial refrigeration and household refrigerator units will continue to be manufactured at Springfield.

Link-Belt Co., Chicago, has purchased the manufacturing plant and inventory of Link Belt Supply Co. in Minneapolis. Ray S. Wood, who has worked closely with Link-Belt Co. for many years, has become plant manager of the supply company.

Michigan Tool Co., Detroit, has opened branch offices in Cleveland and Dayton. The Cleveland branch is located in the Penton Bldg., with George Pierce as district manager; while the Dayton branch is located at 710 Harries Bldg., with H. E. Roedter in charge. P. F. Zerkle has been named to direct sales activities of the organization.

Niles-Bement-Pond Co., W. Hartford, Conn., has acquired the Chandler-Evans Corp. of S. Meriden, Conn., builder of a line of accessories used in airplane engines under the trade name Ceco. Charles W. Deeds will continue as president of the subsidiary company, and the plants at S. Meriden, Wallingford and Dayton, Ohio, will continue to operate as at present, and under the same management and personnel.

Genesee Tool Co., Fenton, Mich., has a factory branch office at 1409 Central Life Insurance Bldg., Cincinnati. E. W. Brock, formerly service manager at the Fenton office has been named service sales manager of the new branch.

Aro Equipment Corp., Bryan, Ohio, has announced the appointment of Thomas O'Malley as division manager in the New England territory with headquarters in Hartford. James Littleton has become division manager in the southern Ohio territory with headquarters in Dayton.

Hub Industries, Inc., producers of aircraft hydraulic equipment in Long Island City, has established a development division at Stamford, Conn., to study postwar applications, principally in the automotive field.

OBITUARIES

Caleb S. Bragg, 56, a leading figure in the aviation, automobile and motor boat fields died after a long illness. Shortly after the first World War he became vice president of the Glenn L. Martin Co. and co-organizer of the Wright-Martin Co. in 1916. Later he formed the Bragg-Kliesrath Corp. in Long Island City for the manufacture of a booster vacuum brake. This was subsequently absorbed by Bendix Aviation Corp. and he became a director and later vice president of Bendix Marine Products Co. Mr. Bragg's last position was vice president and consulting engineer of the C. M. Keys Aircraft Service, Inc., New York City.

W. E. Hedgcock

W. E. Hedgcock, 76, vice president in charge of sales for American Car & Foundry Co., New York, N. Y., died after a brief illness. He began work at the age of 14 for the Ohio Falls Car Mfg. Co. in Jeffersonville, Ind. When that firm was absorbed by American Car & Foundry Co. in 1899, Mr. Hedgcock became associated with the purchasing department in St. Louis. In 1918 he was transferred to the New York office as purchasing agent, then became vice president in charge of sales five years later. He was placed in charge of eastern sales two years later, and in 1941 he was appointed to the post he held at the time of his death.

Richard Ferguson, formerly general manager of the Grant Lees Co., Cleveland, prior to forming his own organization in Gastonia, N. C., passed away at his home after a long illness. He served as president of Ferguson Gear Co. since its inception. Mr. Ferguson had been associated with the American Gear Manufacturers Assn. for many years.

Francis Reuben Harris, 87, a pioneer in the development of special metal alloys, died at his home in Arlington, N. J. In 1889 he founded the Driver-Harris Co. in Harrison, N. J., and was vice president of the firm at his retirement 15 years ago. Mr. Harris was also president of the Globe Wire Co. of Harrison.

MEETINGS

Exposition of Chemical Industries. Madison Square Garden, New York, N. Y. Dec. 6-11.

National Aircraft Standards Committee. National meeting. Lexington Hotel, New York, N. Y. Nov. 8-12.

National Assn. of Manufacturers. Annual convention. Waldorf-Astoria Hotel, New York, N. Y. Dec. 8-10.

Shop Equipment News

DuMont Cyclograph Checks, Sorts and Analyzes Metallic Materials and Alloys by Electronics

Allen B. Du Mont Laboratories, Inc., 2 Main Ave., Passaic, N. J., has developed the Cyclograph, an electronic instrument for checking and sorting metals and alloys for metallurgical properties. It may be used either as a laboratory instrument or for checking and analyzing in the factory. The instrument performs both qualitative and quantitative metallurgical tests on ferrous or non-ferrous metals by non-destructive means.

Machinability, toughness and internal stresses are among the physical properties which can be successfully evaluated with the Cyclograph. Such factors as structure, analysis and heat treatment determine penetration hardness and affect the Cyclograph readings. For instance, the extent of age hardening in aluminum alloys or the decarburization of ferrous materials may be evaluated.

The Cyclograph operates on the principle that metallurgical properties cause variations in the core loss of a tuned pickup coil in which the part is placed. These variations affect the shape of a visible pattern, or cyclogram, shown on the instrument's indicator screens. By means of these pattern variations, the operator determines differences in properties of ostensibly similar parts. By the same means the instrument can be used to inspect incoming metal stocks.

Among the successful applications of the instrument are measuring case depth, core hardness, plating or cladding thickness, carbon content, brittleness and variations in heat treatment. A typical example of work which can be done is the case of a lot of several thousand machine gun bullets which were sorted to separate one group which contained no nickel from another which contained 1.5 percent nickel.

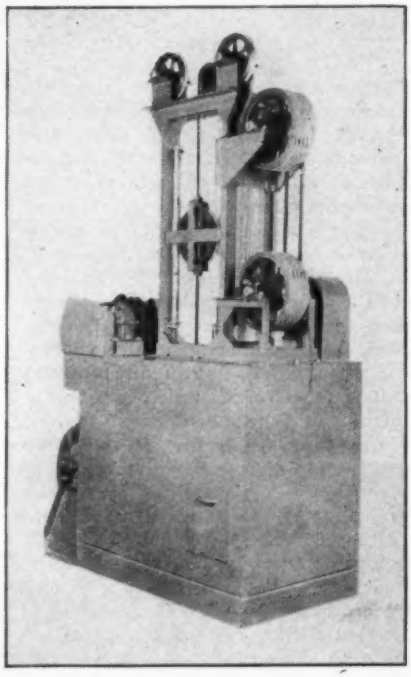
The operator can manually select or reject pieces by the cyclogram readings. The cathode-ray screen can be marked for upper and lower tolerances. In cases where large quantities are to be sorted, an automatic solenoid operated sorting mechanism can be used.

A cyclograph installation includes the consulting services of the Du Mont organization, so for this reason the instrument is not sold, but is leased to users. The instrument is not an all purpose tool, as it must be correlated for the duties to be performed in order that dependable reading may be obtained.

A completely self-contained unit, the Cyclograph is 37 in. wide, 26 in. deep and 51 in. high and weighs 350 lb.

Industrial Oven Produces Wire Wind-Up Machine

A wind-up machine for wire, cable, rope, cord, paper, various kinds of tape, coated fabrics and textiles has been built by Industrial Oven Engineering Co., 11621 Detroit Ave., Cleveland, Ohio. It is available in two

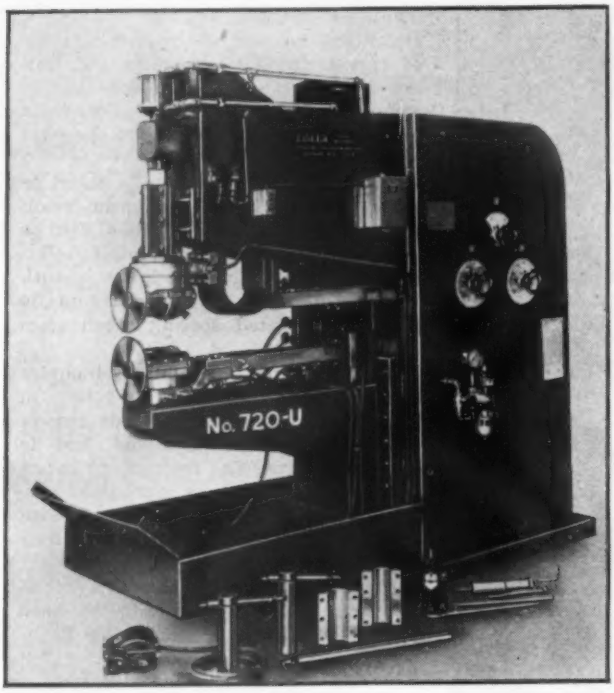


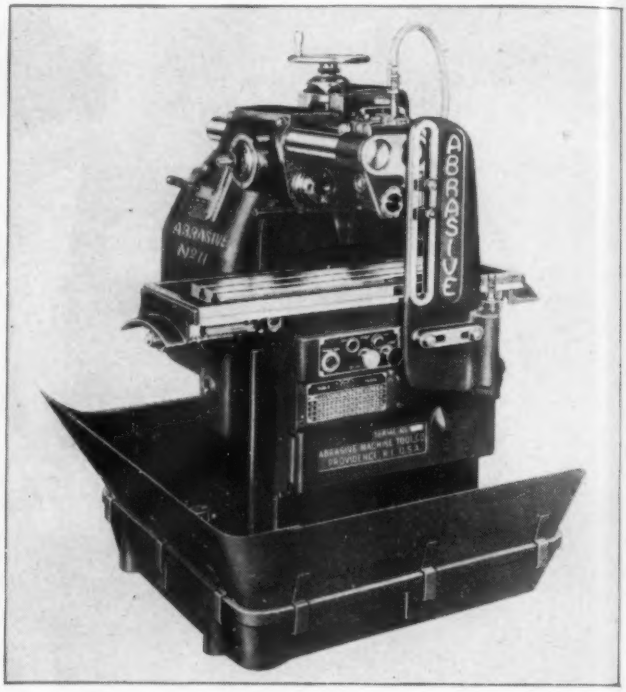
standard sizes. The machine is motor driven and does not require outside source of power or synchronization.

It is a self-contained unit with combination variable speed and hydraulic synchronizing equipment, and is designed to provide constant speed and tension within a variable production range. By arrangement of adjustable counterweights, wire tension can be varied from a few ounces to hundreds of pounds.

This machine comprises a demountable reel stand, multi-wrap capstans of large diameter, variable tension mechanism and an adjustable level winder. It is also equipped with provisions for driving assisting capstans which are required on some grades of fine wire.

For extrusion wind-up in the use of rubber or synthetic insulation materials, this equipment can be obtained in higher operating speeds. Also, continuous wind-up machines are available with high-speed crossover. Unwind stands can be supplied in standard sizes for semi-automatic operation.





Universal Resistance Welder is Used for Seam or Spot Welding

Eisler Engineering Co., Newark 3, N. J., is marketing the universal resistance welder for heavy duty service. This machine is air operated, water cooled and of the automatic press type. It is adaptable for circular and longitudinal seam welding, and, by changing electrodes, for spot welding.

Conversion from circular to longitudinal seam welding is accomplished manually by rotating and fixing the upper and lower turrets in the proper position. Changing the machine for spot welding requires the removal of the seam wheel shafts and the installation of spot welding horns.

In either seam or spot welding the upper electrode, attached to a large square ram, is actuated by a double-acting air cylinder. Electrode pressure is adjustable by an air pressure regulating valve. Complete automatic control can be applied to the welder by the addition of an electronic or mechanical contactor and welding timer.

The welding transformer is available in 100, 150 and 200 kva. sizes and larger; 220 or 440 volts; 60 cycle. Heat regulation for a wide range of materials and material thicknesses is provided for by dial control.

Overall dimensions of the 100 kva. machine are: height 88 in.; length 93 in., and width 47 in. The machine weighs 6,200 lb.

Welding operation is started by a foot switch which has two treadles, one for and the other closes the circuit.

Guth Quick-Liter Fixture Has Super-Ballast Starting

The Quick-Liter fluorescent fixture made by Edwin F. Guth Co., 2615 Washington Blvd., St. Louis 3, Mo., uses a super-ballast with a patented wiring circuit that starts lamps without the use of starter switches. The fixture is available in sizes for two 40 watt and two 100 watt lamps, either 110-120 or 220-240 volts. All wiring and ballasts are inclosed in an all-steel top-housing. Added lampholder protection is provided by the bump-proof endplates. The reflector is Masonite Reflector-Board and is finished in synthetic enamel. Eggcrate louvres are available for lamp shielding.

Abrasive Machine Tool Co. Makes Plain Milling Machine

A plain milling machine of the manufacturing type is now being manufactured by the Abrasive Machine Tool Co., East Providence, R. I. Known as the B-11, the Abrasive miller is designed for medium sized work in long or short runs. It has complete electrical control for table and spindle power movements.

A built-in backlash eliminator on the table screw is released automatically during fast travel. This permits climb milling in either direction to the complete capacity of the driving motors. Table movement can be changed quickly and precisely through the electrical controls. Other features of the machine include automatic reverse, fast table travel up to 300 in. per min. and a wide range of feeds and speeds. Additional sets of dogs and extra table controls may be used to increase the number of milling cycles provided.

The control stations and control units are so placed as to provide ready accessibility for operation and maintenance. Most set-up adjustments can be made from the front of the machine. Safety features incorporated in the machine protect both the operator and the machine.

It is said that the machine is quiet and flexible in operation and has many new features to increase production.

ELECTRIC MOTORS
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TRUCK AXLES
MACHINE TOOLS
AIRPLANE ENGINES
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AIRPLANE TAILWHEEL
AIRPLANE LANDING GEAR
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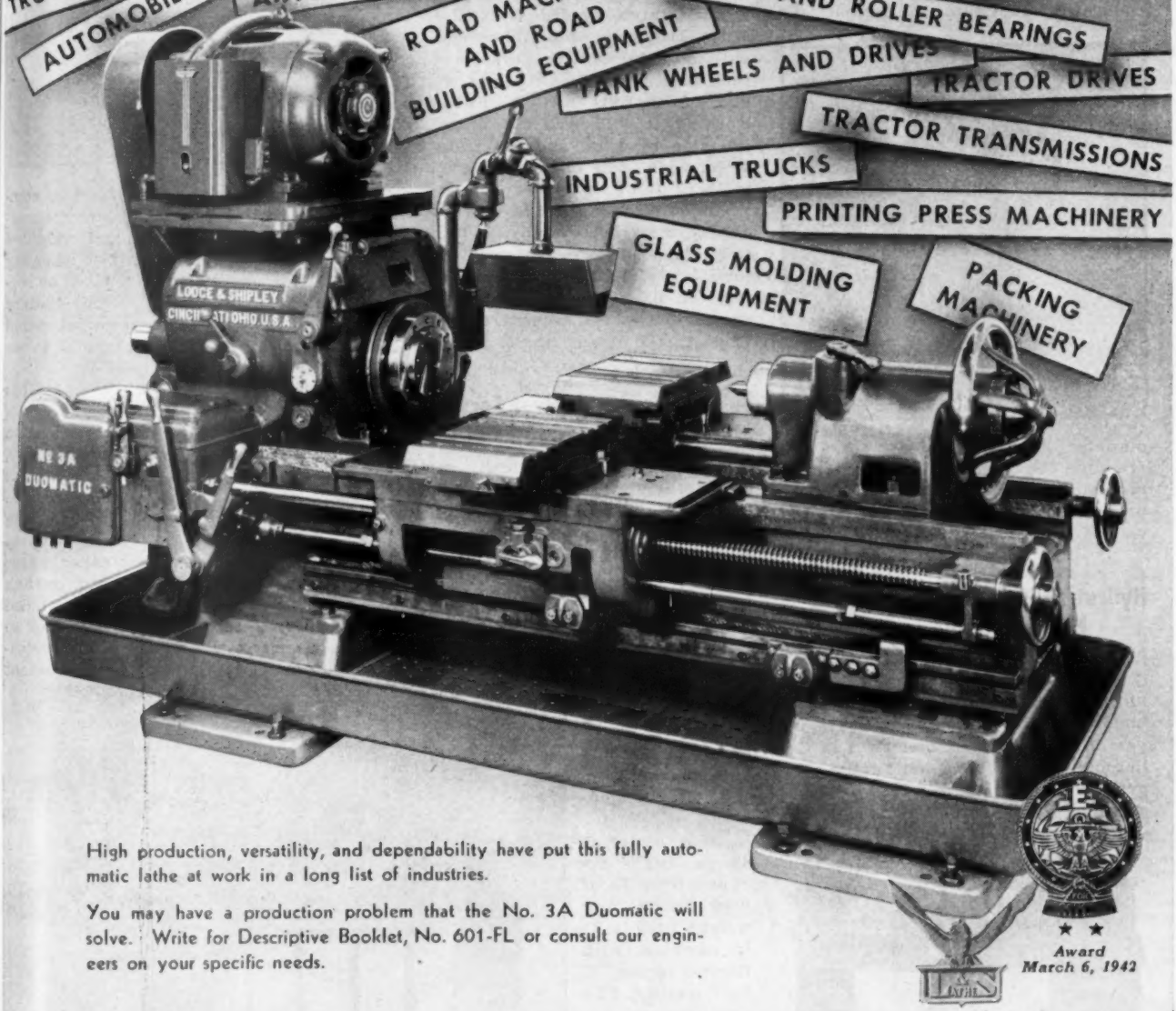
AUTOMOBILE STEERING GEAR
AUTOMOBILE TRANSMISSIONS
PUMP EQUIPMENT
ROAD MACHINERY AND ROAD BUILDING EQUIPMENT
BALL AND ROLLER BEARINGS
TANK WHEELS AND DRIVES
TRACTOR DRIVES
TRACTOR TRANSMISSIONS
INDUSTRIAL TRUCKS
PRINTING PRESS MACHINERY
GLASS MOLDING EQUIPMENT
PACKING MACHINERY



High production, versatility, and dependability have put this fully automatic lathe at work in a long list of industries.

You may have a production problem that the No. 3A Duomatic will solve. Write for Descriptive Booklet, No. 601-FL or consult our engineers on your specific needs.

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Award
March 6, 1942

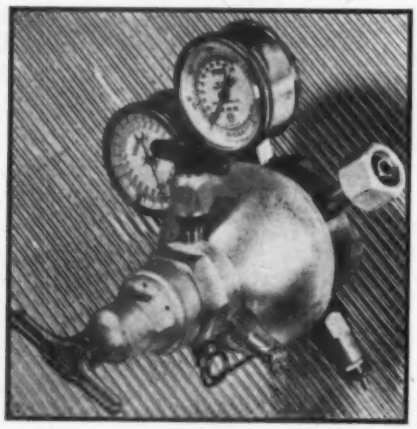
THE LODGE & SHIPLEY MACHINE TOOL CO.
CINCINNATI, OHIO, U.S.A.

ENGINE TOOL ROOM AUTOMATIC OIL COUNTRY LATHES

Victor Pressure Regulator For Cylinder Refilling

No. 4000-1000 pilot type pressure reducing regulator has been developed by Victor Equipment Co., 844-854 Folsom St., San Francisco 7, Calif., for refilling cylinders from cylinder manifold systems. This model is available for inlet pressures up to and exceeding 4,000 lb. per sq. in., and for delivery pressures up to and exceeding 1,000 lb. per sq. in.

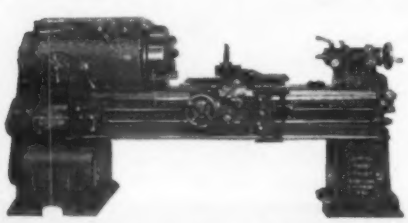
The diaphragm is gas-loaded and built to prevent it from damage or rupture. A built-in pilot regulator controls the loading pressure of the main regulator. Arrangement of the tension screw prevents a diaphragm loading pressure beyond a predetermined maximum. If the loading pressure should exceed a desired maximum, an adjustable relief valve is provided to reduce the pressure to normal. To



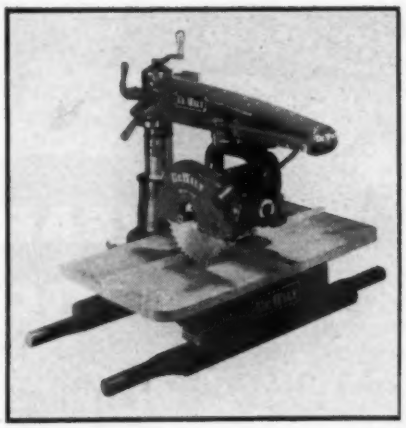
diminish a previously set operating pressure, the tension screw of the pilot regulator is released and the dome pressure is exhausted by a release valve.

Hydratrol Hollow Spindle Lathe Now Available in 18 In. Size

Lehmann Machine Co., Chouteau at Grand, St. Louis 3, Mo., has added to its line an 18 in. size Hydratrol large hollow spindle lathe, with a 7⅛ in. hole in the spindle. Other sizes in the line of large hollow spindle lathes are available up to 36 in., with 16½ in. spindle hole. These machines are



equipped with hydraulic brakes and clutches, and the mechanism of the lathe is protected by automatic control. The lathes are available with large turrets for carriage and beds on both ends of the headstock.



De Walt Makes Radial Saw For Cutting Light Metals

A portable model radial saw is being manufactured by De Walt Products Corp., Lancaster, Pa. When equipped with a metal saw or abrasive wheel, this machine will cut light ferrous and non-ferrous metals. For woodworking, it will cross cut material 14 in. wide by 1 in. and rip from 0 to 26 in. wide. The machine is available in 1½, 2 and 3 hp. sizes.

The cantilever arm moves vertically and swings horizontally. The yoke rolls along the arm and rotates horizontally. Weight of the motor is always in line with the center line of the yoke, arm and column, and is designed to tilt at any angle.

Tubin Screw and Rivet Sorter Handles Many Lengths at a Time

A machine for automatically sorting to length dural, brass and steel machine screws, bolts and rivets has been produced by Tubin Engineering & Manufacturing Co., 764 South San Pedro St., Los Angeles 14, Calif. The machine delivers from 85,000 to 100,000 sorted parts in eight hours, sorting to ⅛, 1/16 and 1/32 in. variations in lengths. Twenty-four different lengths can be sorted at a time into separate receptacles, with a throw-off receptacle for lengths not set for sorting on the machine.

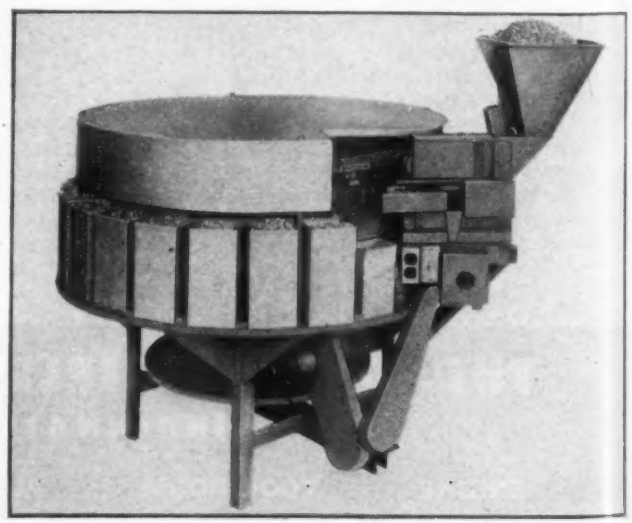
The sorter is 48 in. high, occupies 5 sq. ft. of floor space, and weighs 1,200 lb. It is powered with friction drive, ¼ hp. motor, 110 volt, a.c. or d.c. This machine can be used with type sorting by belts and diameter sorting through rollers, providing reclamation of small parts.

Amsco Starter Tester Available in Two Types

The Amsco starter test stand is being offered by Airplane Manufacturing & Supply Corp., 6853 Lankershim Blvd., North Hollywood, Calif. A single mounting plate is provided for right or left direction S.A.E. 5, 6 or 7 in. aircraft starters. This plate is supplemented by three adapter plates and

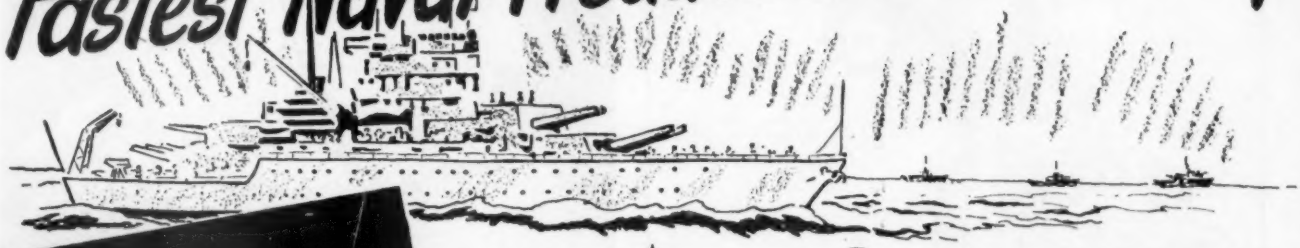
four starter jaws. The stand is compactly arranged in a cabinet measuring 36×28×38 in. high and mounted on ball bearing casters for wheeling about the shop. Either battery or rectifier model is available. The battery model contains a charger with signal light on the instrument panel to indicate charger operations.

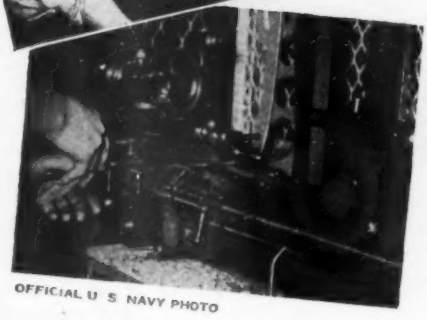
Starter tests are obtained by the torque action of the starter transmitted through a two-way torque arm to a double-action hydraulic cylinder, which in turn registers in foot-pounds on a maximum limit hand pressure gage. The usual gage furnished with the tester unit allows readings up to 2,800 ft.-lb. pressure, but other gages may be supplied. A selector switch for 12 or 24 volt operation is included as part of the panel in addition to other necessary switches. The instrument panel is slanted for convenient reading and switch accessibility.



CUTTING THE STEELS OF WAR

FOR THE Fastest Naval Production in History





OFFICIAL U. S. NAVY PHOTO

★

In Industry! Typical of the way carbides are helping to speed production of hundreds of parts in industry for naval use is this job of machining cast steel pinion bearings for main drives of destroyers. Cutting at 220 feet per minute, Carboloy tools reduce machining time at least 25%.

★

In Navy Yards! In the Navy Yards, too, carbide tools are a vital factor in helping speed production. At Portsmouth Navy Yard, for example, Carboloy tools machine cast steel frames for watertight doors on submarines at speeds 100% faster than before. For this intermittent cutting job, Carboloy grade 78-C tools cut at 150-175 F.P.M., .032" feed, with varying depth of cut up to 5/8".

★

In Naval Ordnance Plants! Here again carbide tools have a job to do—and are doing it! Typical is the milling of steel breech casing at a midwestern U. S. Naval Ordnance Plant. Carboloy mills—operating at 650 S.F.P.M., 7½" table travel—eliminate one milling machine and two grinders through faster operation and better finish obtained.

★

On the High Seas! When repairs are needed far from port—the Navy is prepared! "Floating" machine shops with modern, efficient equipment—including carbide tools—are a standard part of large Naval vessels.

IN U. S. Navy Yards, in Naval Ordnance plants, aboard naval vessels, and in all important plants of suppliers to our navy, you'll find carbide tools helping to speed up schedules—turning out the steels of war!

The ability of carbide tools to machine at high speeds, produce an unusually high quality of finish, reduce machine downtime, and cut heretofore non-machinable alloys, has been put to extremely good advantage by those charged with the responsibility for the greatest naval production in history.

★

Every facility of Carboloy Company has been made available to the U. S. Navy in an all-out program of cooperation. Carboloy representatives from coast to coast are on call whenever needed; Carboloy Training Films are at work helping speed naval training activities in the field; and the Carboloy Training Course at Detroit has trained, and is continuing to train, key navy men responsible for carbide tool use in naval production.

CARBOLOY COMPANY, Inc., Detroit, Mich.

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Canadian Distributor: **Canadian General Electric Co., Ltd., Toronto, Canada.** ***Foreign Distributor:*** **International General Electric Co., Schenectady, N. Y.**

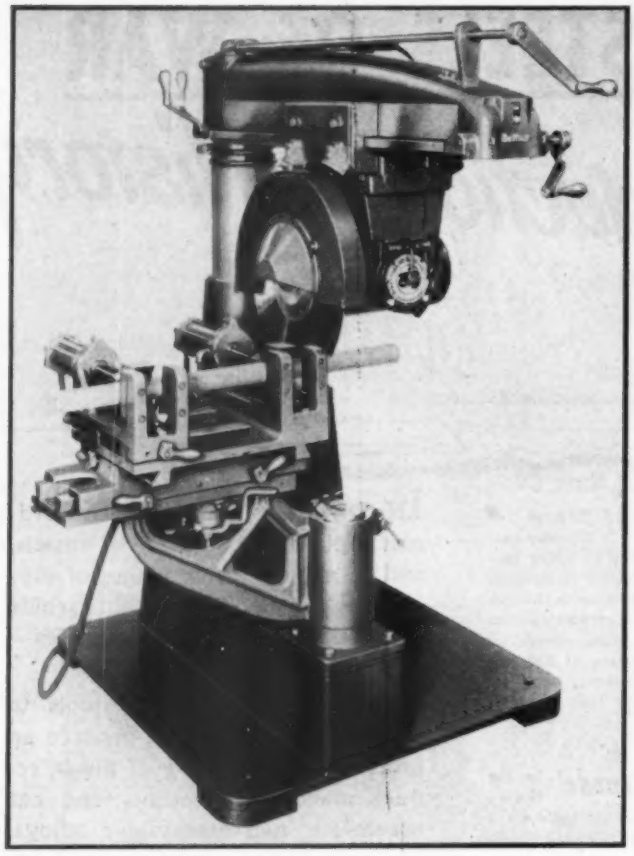
TUNGSTEN CARBIDES For Cutting CAST IRON and Non-Ferrous Metals

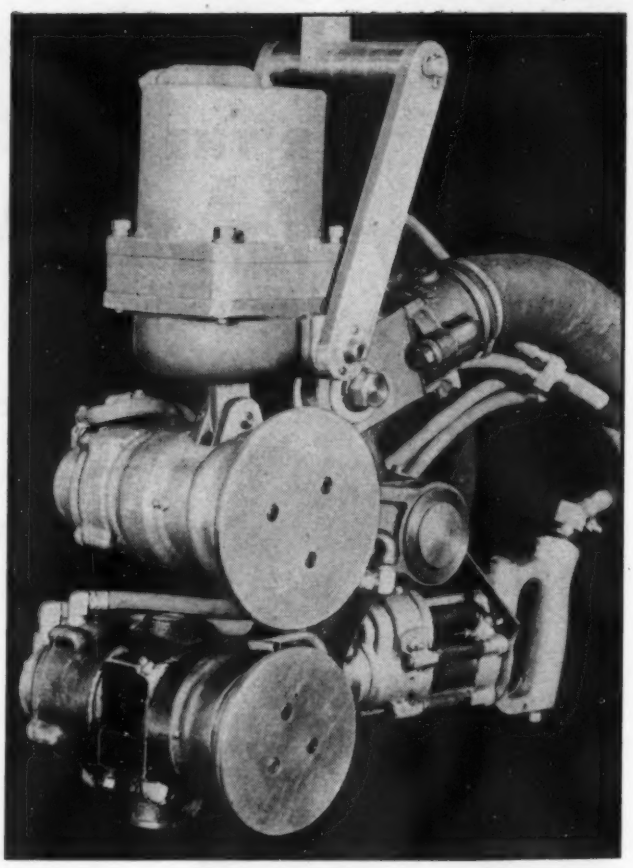
CARBOLOY

(TRADEMARK) CEMENTED CARBIDES

TITANIUM TANTALUM CARBIDES For Cutting STEEL

FOR HEAVY HOGGING • • • PRECISION FINISHING • • • INTERMITTENT CUTTING





De Walt Tube Cutting Machine For Straight and Angle Cutoff

All types of straight and angular cutoff operations on tubes, bars, formed and extruded shapes in ferrous and non-ferrous metals can be performed on the tube cutting machine manufactured by De Walt Products Corp., Lancaster, Pa. With friction-type saw blades it cuts ferrous metals having wall sections up to ⅛ in. thick, and solids up to 1½ in. diameter can be cut by the use of abrasive wheels.

The arm which carries the motor and roller head assembly will turn 360 deg. about the column. Total movement of the head is 25 in. along the length of the arm tracks. Travel is controlled by a chain drive and sprocket assembly manually operated. The machine requires a floor space 56×56 in. Maximum elevation from the floor to the highest point on the machine is 74¼ in., minimum elevation is 58¼ in. Weight of this machine is 2,100 lb.

The vise assembly is designed to permit rotation in a 300 deg. arc around the vise column with an air control valve located accessible to the operator. Three movements are provided in this air vise. Lateral movement is 19 in., while movement from front to back is 7 in. It has a 5-in. stroke, and holds sections up to 4 in.

The cutting member is assembled direct to the motor shaft of a totally inclosed motor. The motor can be furnished for 220, 440 or 550 volts, for operation on 2 or 3 phase, 60 cycle, a.c., 10 hp., 3,450 r.p.m., direct drive, for use with ferrous metal cutting blades; or 1,800 r.p.m., 5 hp. motor for use with formed grinding wheels or for saw blades for cutting heavy sections of non-ferrous metals. A push-button station is located at the end of the arm for operators' convenience.

Cunningham Gear Marking Holder Offered in Safety Hand Model

A safety hand model gear marking holder is being offered by M. E. Cunningham Co., 115 East Carson St., Pittsburgh 19, Pa. The type plate is cut out for the exact number of characters and letters desired, with

straight type used instead of tapered type. Characters are prevented from falling out of the holder by a special method of holding them in place. The pilot, designed to suit the hub of the gear, allows perfect positioning of the letters.

Portable Seam-welding Machine Is Announced by Progressive

Parts too large to be moved to a standard machine can now be seam-welded by means of a portable air-operated gun made by Progressive Welder Co., 3050 E. Outer Dr., Detroit 12, Mich. The unit is already being used to weld 22 ft. long seams on disposable gas tanks.

A 2 hp. air motor operates the head. Standard speed of the welder is between 48 and 52 in. per min. when using standard rolls or wheels. Designed for welding steel, including stainless, up to two thicknesses of 20 gage, the gun is universally suspended and can be swiveled for welding in almost any direction.

Air flowing into the gun's cylinder through the handle forces the upper and lower wheels together; the lower being the driven wheel. When air pressure reaches a preset pressure, the welding timer is started and welding begins. The gun has a throat depth of 3 in. and a stroke of ½ in. when the wheels are new. It has a 2 in. maximum stroke when wheels are worn. Two wheels are provided, one 5 and one 6 in.

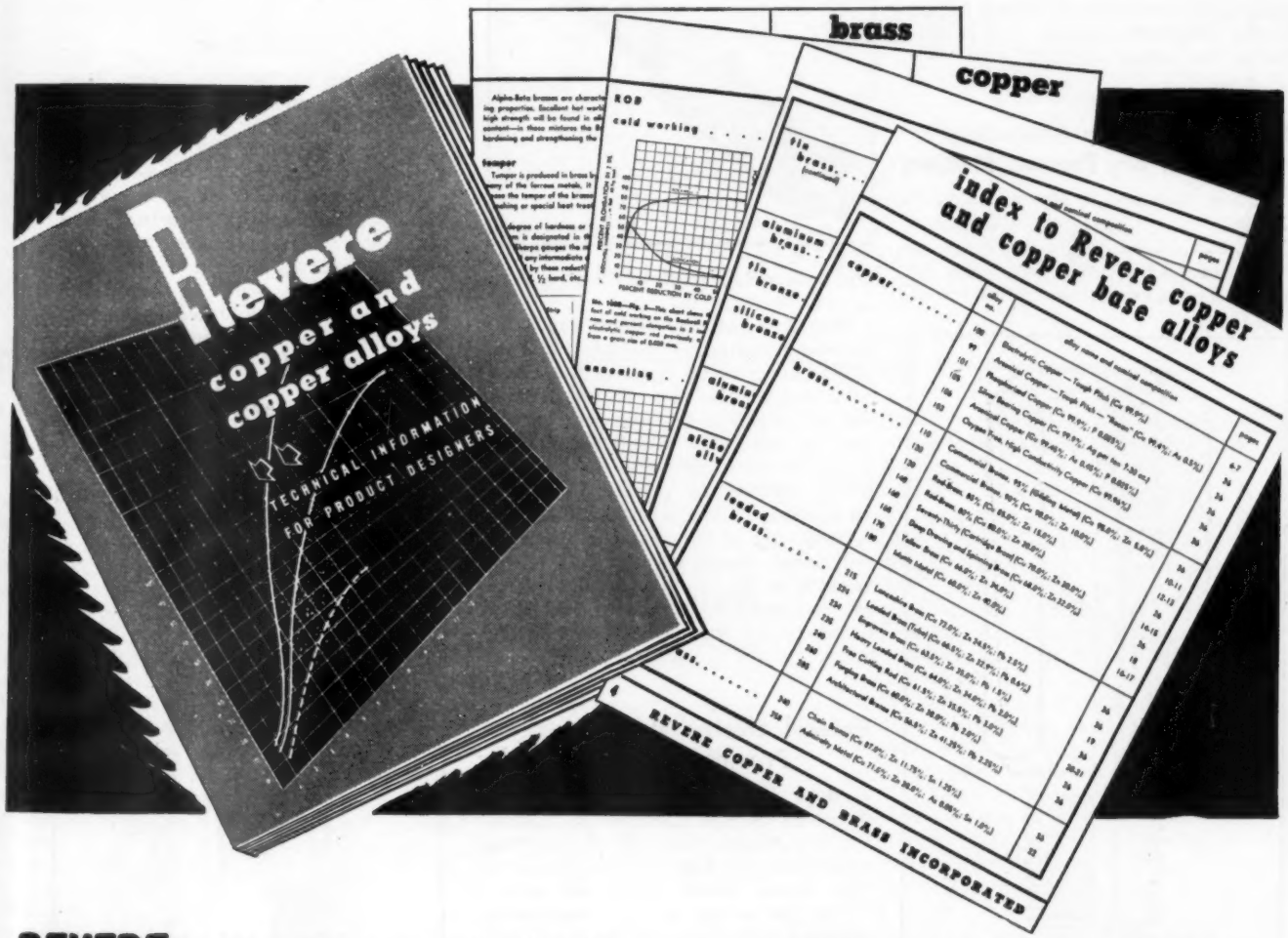
Gear reduction from the motor to the driven wheel allows speed changes and a dial-type switch with six stages of heat selection permits accurate heat control.

Provision is made for a large volume of cooling water, as nearly five gallons a minute is required to obtain optimum performance from the welder.

THIS NEW MANUAL CAN HELP YOU

"Revere Copper and Copper Alloys—technical information for product designers"

Just off the press. New. Informative. Invaluable to anyone working with NON-Ferrous metals . . . this 54 page manual—"Revere Copper and Copper Alloys—technical information for product designers", contains 106 graphs relating to physical and metallographic properties under varying conditions; also a new, easy-to-read chemical and physical properties chart, together with pertinent illustrated information on Revere manufacturing forms and welding technique. Send for your complimentary copy. Address: Executive Offices.



REVERE is glad at all times to work with customers and prospective customers in solving any special problems. Our technical advice is yours for the asking—without obligation. Address our Executive Offices.

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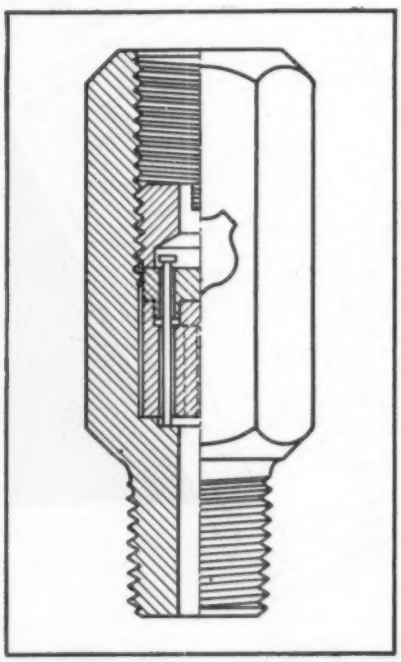
Saf-t-Bra Made of Plastic Protects Women Workers

The Saf-t-Bra, made by Willson Products, Inc., Reading, Pa., provides protection for breasts of women workers in industry. It is made of a durable plastic in fleshtone color, and is available in three sizes, small, medium and large: brassiere sizes 30 to 38, 39 to 44 and 45 to 48, respectively.

This bra is designed to extend well back under the arms to prevent injury of the lymphatic glands, and is ventilated for added comfort.

Ashcroft Pulsation Dampener Suited for Any Pressure Medium

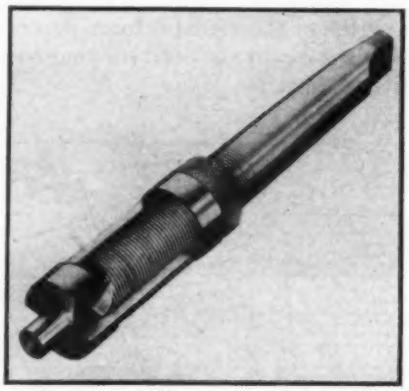
Manning, Maxwell & Moore, Ashcroft Gauge Div., Elias St., Bridgeport, Conn., has placed on the market Type 1106 Ashcroft pulsation dampener for use with pressure gages subject to pulsations and rapid fluctuations. It is a small, compact throttling device for pressures up to 5,000 lb. per sq. in., and for any pressure medium such as air, water, oil or steam. The dampener is made of hex brass rod with ¼ in. female National pipe thread to fit gage connection, by ¼ in. male National pipe thread. This unit is 2⅛ in. long.



The plunger oscillates freely in a cylindrical hole in the bushing to give the throttling action. Five different size holes are provided in the bushing so the plunger may be transferred from one hole to another, depending upon the degree of dampening required. All holes except the one in use are sealed by the sealing disk.

Nash-Zempel Spot Facer Has Removable Cutter

The Nash-Zempel spot facer and counterboring tool, made by J. M. Nash Co., Tool Div., 2354 North 30 St., Milwaukee, Wis., is available in 41 standard sizes. Bar diameters of the tool range from 1 to 3½ in., and cutter sizes range from ⅛×1×2 1/16 to ⅜×3½×4 15/16 in.

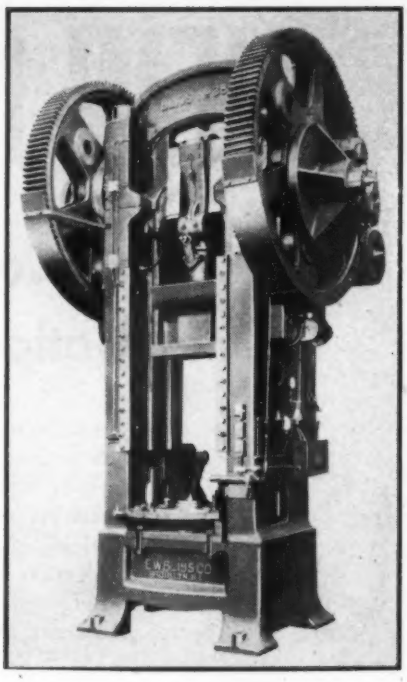


The cutter of this tool is removable for resharpening by loosening knurled and cone nuts and slipping the cutter back out of the bar. Exact location for replacement is obtained by the web in the body which locates the fingers of the cutter, and the cone nut which centers the rear of the cutter on a straight line with the bar. The cutting edge of the cutter is always in the same location, and chip clearance is in the bar. The pilot of the tool is tapped for a screw which holds bushings for various sizes of drilled holes.

General Electric Door Switch Provided as Safety Device

A door interlock switch being produced by General Electric Co., Specialty Div., Schenectady, N. Y., provides emergency control circuits interruption where access doors are opened while the power is on. Application covers a wide range where doors, windows or covers must be interlocked for protection of equipment and for safety of the operator.

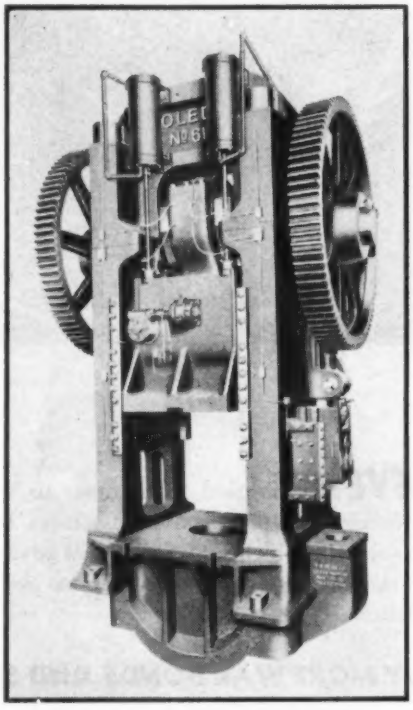
This switch has capacity of 10 amp., 110 or 220 volts a.c. or d.c.; and an emergency opening capacity of a.c. 7½ amp., 110 or 220 volts; d.c. on low inductive circuits, 5 amp., 125 volts; 2½ amp. 250 volts.

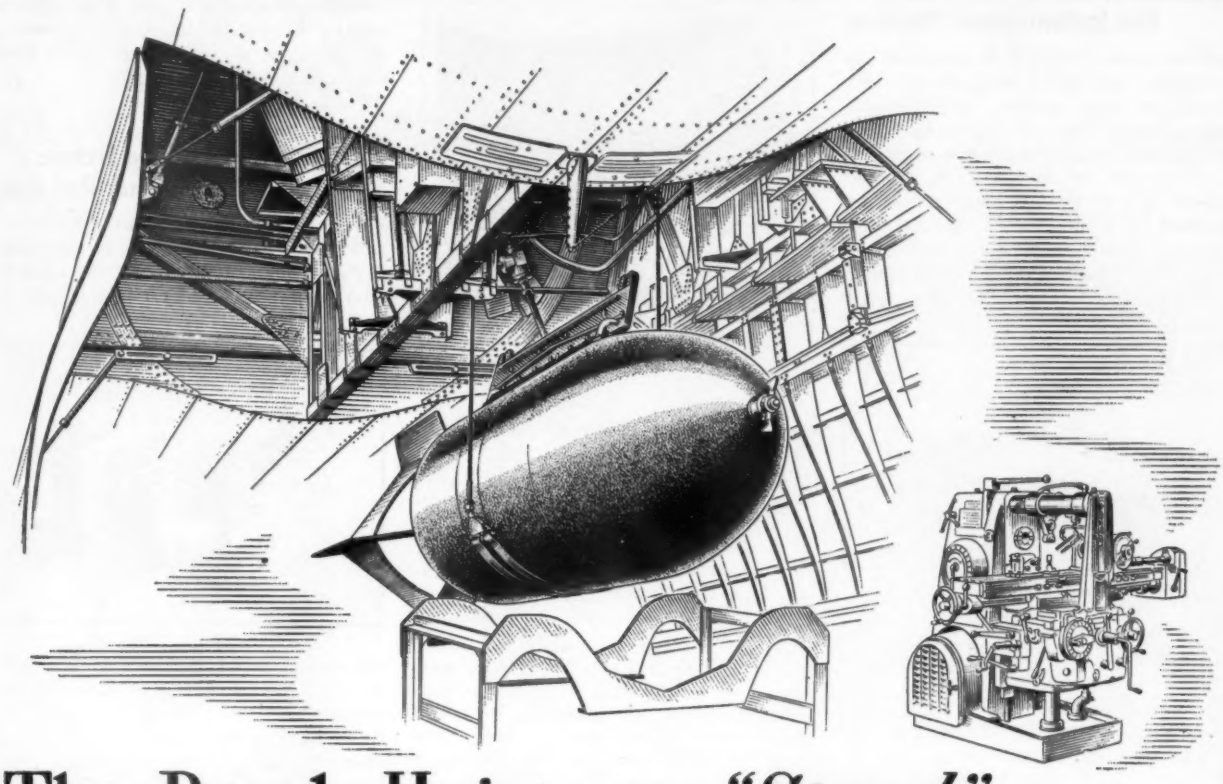


Correction

Through an unfortunate error, illustrations appeared with the wrong items in describing two recent developments of the E. W. Bliss Co., 53 St. and Second Ave., Brooklyn 32, N. Y.

The illustration above is the Bliss No. 88-A mechanical reducing press which should have accompanied the story describing this unit in AMERICAN MACHINIST, Sept. 30, page 118. Shown below is a 2000-ton mechanical trimming press manufactured by the E. W. Bliss Co., Toledo Division. This illustration should have accompanied the description appearing in AMERICAN MACHINIST, Oct. 14, page 145.





The Bomb Hoist was *"Struck"* by Something in the Milling Machine

IT MAY BE NEWS to some that a part so long at home in milling machines proved equally effective in bomb ammunition hoists. For the milling machine is a precision tool in which ease and speed of operation are vital. Noted for its anti-friction operation, the Torrington Needle Bearing is used in some of the most famous of these tools to meet just such milling machine "musts" on various hand and power-operated trip levers.

With the bomb ammunition hoist ease of operation is, of course, important, too. But of even greater concern in these days of mightier and mightier "blockbusters" is the danger of overloading. Where bomb hoists do their work, "spares" and often adequate repair facilities may be painfully conspicuous by their absence. That's why the Needle Bearing scored a "direct hit" with the designers of bomb hoists—its high unit capacity helps prevent overloading or breakdowns, and low coefficient gives it a "made-to-order" operating ease.

The pay-off, however, is that this unique anti-friction bearing had several *other* features which helped build a better bomb hoist—its compact size saves weight, increasing maneuverability...its effective system of lubrication means less servicing attention required...its long service life speaks for itself...while the ready availability of the Needle Bearing eliminated one of the most frequent obstacles in war production—delay in delivery.

ISN'T THIS SOMETHING TO THINK ABOUT in planning your postwar designs? Not alone because of the Needle Bearing's adaptability to a wide variety of products for entirely different reasons, but also because its unique combination of advantages represent the very features customers will be looking for Tomorrow in the things for peacetime living—light weight, compactness, ease of operation, freedom from maintenance and long life. Torrington engineers are ready to point out how you can give your product these same advantages with the Needle Bearing. For preliminary information on sizes, types and ratings, together with a list of typical applications, send today for Catalog No. 105.

NEEDLE BEARINGS—ALL TYPES—ALL SIZES

NEEDLE BEARINGS TYPE DC are complete, self-contained units consisting of a full complement of rollers and a drawn, hardened outer race. They offer the advantages of small size, low cost, high capacity—and easy installation.

NEEDLE BEARINGS TYPE NCS consist of a full complement of rollers and a relatively heavy hardened outer race. They are furnished with or without inner races. Needle Bearings Type NCS are adaptable to heavier loads than Needle Bearings Type DC.

NEEDLE ROLLERS TYPE LN are produced in a range of types and sizes for assembly on the job into low-cost, high-capacity, anti-friction bearing units. Our engineering department will be glad to advise on the correct size and type for any application.

THE TORRINGTON COMPANY

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Makers of Needle Bearings and Needle Bearing Rollers

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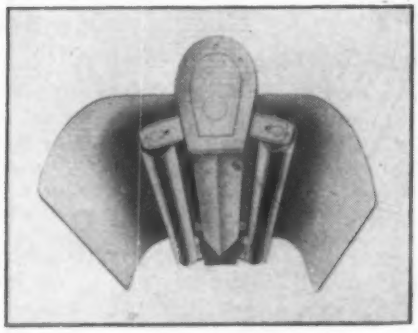
TORRINGTON NEEDLE BEARINGS

Fostoria Fluorescent Unit Has Instantaneous Starting

Instantaneous starting is provided in the Model MF-240-N fluorescent unit placed on the market by Fostoria Pressed Steel Corp., Fostoria, Ohio, by eliminating the use of starting switches. The unit is designed to accommodate two 40 watt fluorescent lamps mounted on 5 in. centers, operates on a power factor of 98 percent at 118 volts and is connected for stroboscopic effects. Elimination of starting switch-



es is said to reduce maintenance costs and eliminate blinking of lamps when the end of their useful life is near.

This Generalite model is constructed with the V-shaped wiring channel which separates the two lamps. The non-metallic reflectors are removable from the top without interrupting lamp operation. When the reflectors are removed, all wiring in the channel is exposed to full view. The lighting fixture is finished inside and out with gloss white synthetic enamel.

Speedaloy Tipped Tools Machine Many Materials

Speedaloy has been developed by Tungsten Alloy Manufacturing Co., Newark, N. J., and is available in solid toolbits, flats and in a variety of tipped tools. This is a cast tungsten-chromium-cobalt alloy that will machine all materials with the exception of manganese steel and chilled iron. Speedaloy is said to be exceptionally suitable for chromium and nickel alloys, including stainless steel. This cast tungsten-chromium-cobalt alloy is said to stand up better than high-speed steel and have higher shock resistance than tungsten carbide.

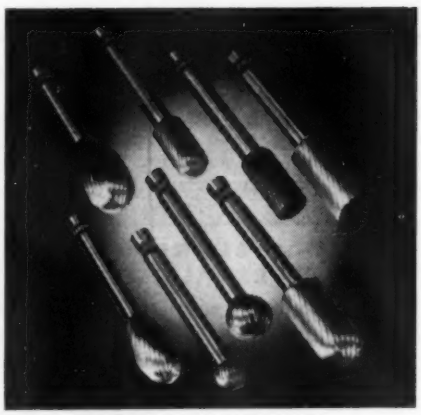
Gray-Mills Coolant Cooler Refrigerates Mechanically

Model 400 industrial fluid cooler has been produced by Gray-Mills Co., 213 West Ontario St., Chicago, Ill. The unit mechanically refrigerates fluids, settles and screens out chips and the coarser abrasives, and applies the coolant or fluid to the work through a self-contained pump. This model occupies a floor space 28½×33 in. and stands 44 in. high. It is equipped with

a 1 hp. compressor rated at 11,800 B.t.u. Centrifugal or gear type coolant pumps are optional.

The cooler is adapted to cooling and temperature maintenance of coolants for metal cutting, hydraulic oil applications, spot-welders, quenching oils, maintenance of submerged bearing temperatures and laboratory set-ups. The equipment is portable and ready for use by plugging into the power line. The cooling tank has capacity of 35 gal., and is equipped with removable 45 deg. settling and filtering screens and baffle plate for removing chips and abrasives.

Carbur Adds Six Tools To Line of Rotary Files



Six tools have been added to the standard line of cemented-carbide rotary files made by Carbur, Inc., Lincoln Park 25, Mich. These files are available in three shapes, each of which is furnished in two sizes. Cutting teeth are ground from the solid.

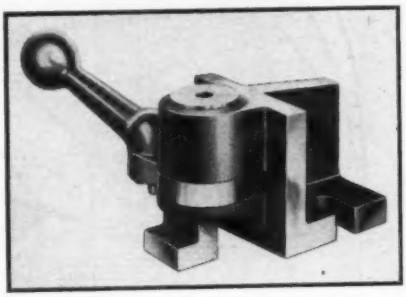
Emeri-Crete Floor Patch Is Ready-Mixed Material

For use in filling cracks, small depressions, ruts or other inequalities in concrete or cement floors, Walter Maguire Co., 330 West 42 St., New York 18, N. Y., has available Emeri-Crete packaged in small quantities.

This material is composed of fine particles of emery mixed with a quick-setting binder which permits use of the floor in six or seven hours after the repair has been made.

Wayne Collet Chucking Fixture Furnished With Undrilled Jaws

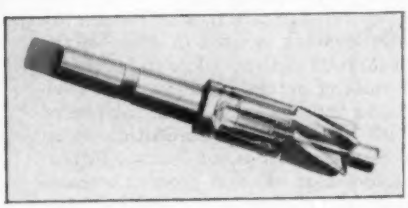
Wayne Pump Co., Fort Wayne 4, Ind., has produced a collet chucking fixture for holding stock in machine operations. It has been designed to



use a four-piece spring-actuated collet so that the collet jaws can be furnished undrilled. Thus the jaws can be drilled by the operator to hold any special size or unusual shape. This fixture accommodates stock from 0 to 1 in., although the size is limited to 9/16 in. if the stock must pass through the collet. Measurements of the fixture are 7×4 in. at the base, and it is 4 in. high.

Blank jaws are held together with a retainer ring, and may be kept in the bin ready for use. They are furnished in either cold rolled or tool steel.

At a touch of the button under the handle it may be moved to any position out of the way of the work, or for convenience of a left- or right-handed operator. Slots in the fixture provide easy attachment to a bedplate.



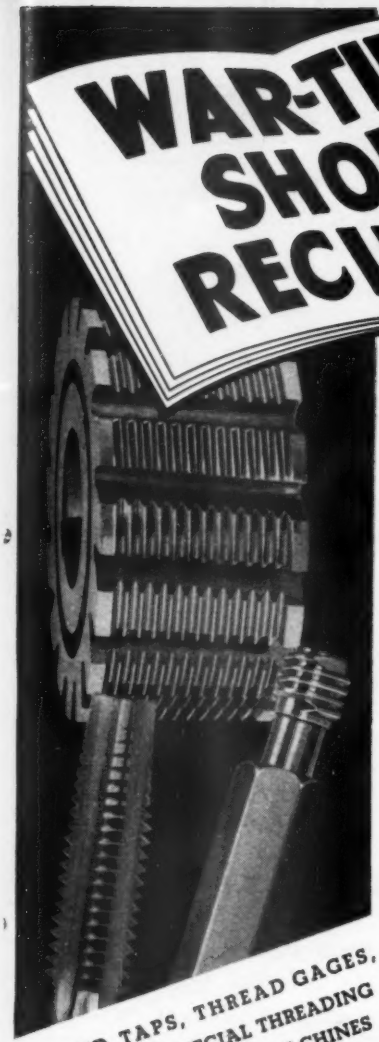
Moreland Counterbore Drive Built to Eliminate Shearing

Moreland Tool Co., 16935 West McNichols Road, Detroit, Mich., has produced a counterbore drive which is available for a range of cutters up to and including 3 in. diameters. The drive can be supplied with straight or taper shank.

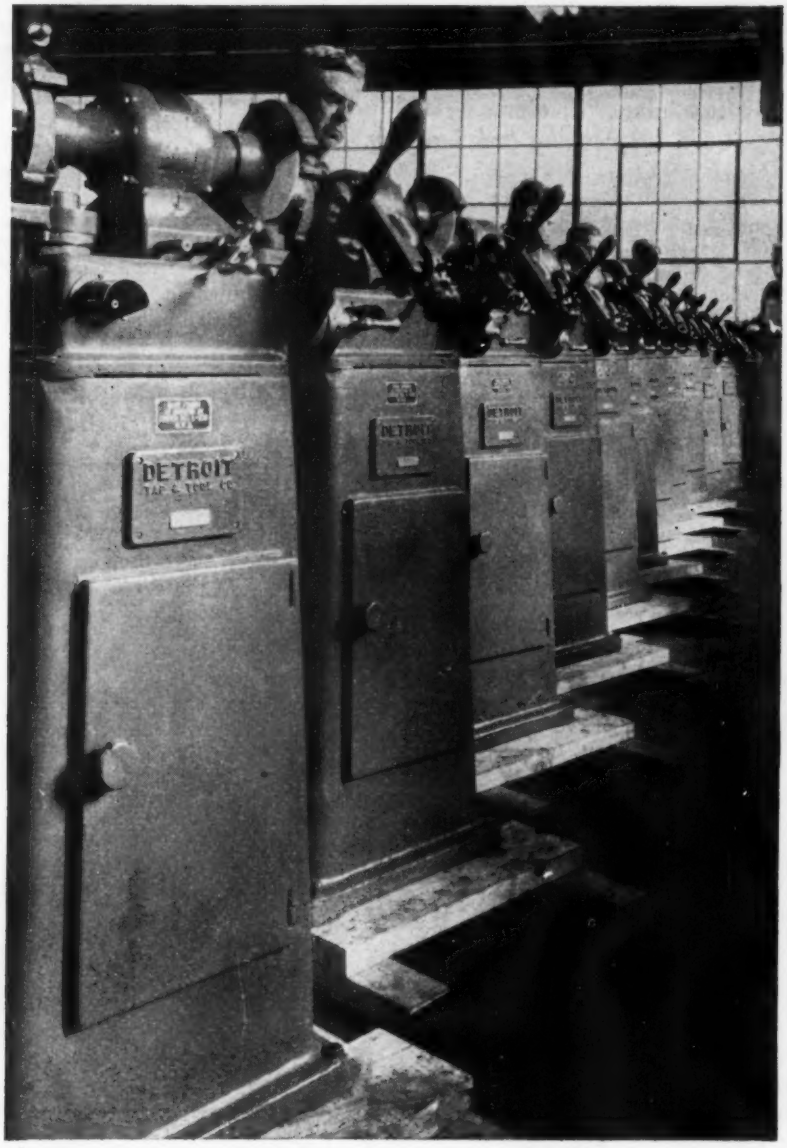
The driving member of the cutter fits into a spherical off-center hole in the holder, both shank of the cutter and the corresponding hole in the holder being round in shape and eccentric in location only. This method of coupling is said to eliminate any ten-

WAR-TIME SHOP RECIPES

#3 for thread production



GROUND TAPS, THREAD GAGES, THREAD HOBS & SPECIAL THREADING TOOLS. SPECIAL TAPPING MACHINES



In view of the extreme demand for reconditioning equipment to reduce consumption of taps by war industries, Detroit Tap and Tool Company has put its Reconditioner in mass production.

Above is a view of the final assembly line.

For information on this machine write or wire for Bulletin TR-42.

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DETROIT TAP & TOOL CO.

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dency to shearing action. Concentricity of the unit is held to close tolerance by means of a stick taper. The angular notch is positioned to assure a full contact of the driving members from the start.

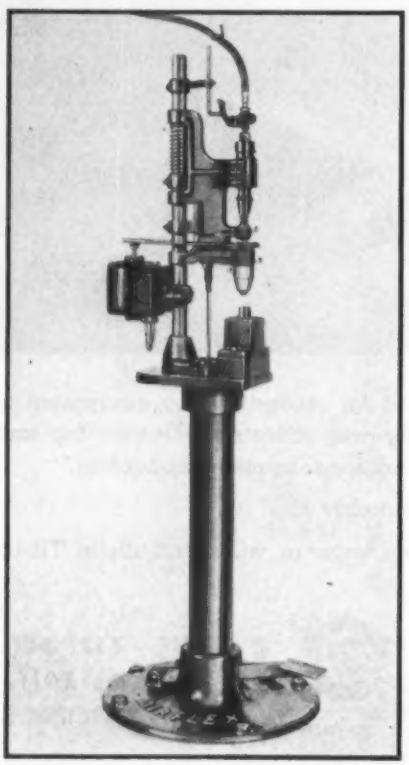
The pilot acts as a guide, and the cutter can be drifted from the holder without disturbing its location. A brass nut holds this guide in place. The length of the pilot permits sharpening away more than two-thirds of the cutter without affecting the drift-out features of the cutter or the concentricity of the pilot.

Airflex Spinner Riveter Used for Peening and Swaging

Spinner riveters for making round, oval and flat head rivets, for peening shafts, pins and studs, and for furling or swaging shoulder bushings and light tubes to sheet metal or plastics are being made in three models by Airflex Equipment Co., 13255 Birwood, Detroit, Mich. The SP-75 model has 5/32 in. capacity; SP-100 has ¼ in. capacity, while the SP model has 5/16 in. capacity.

This riveter features a pressure pad which consists of an aluminum housing, spring and pilot. The pilot foreruns the peening tool to hold the assembly rigidly against the rivet set and to eliminate vibration.

While rotating, this equipment delivers ¼ in. maximum strokes from an air-operated peening tool. A ⅛ hp. ball-bearing type vertical motor with pushbutton control is used for the rotating motion while the air is regulated from a petcock to adjust the force and frequency of the blows.



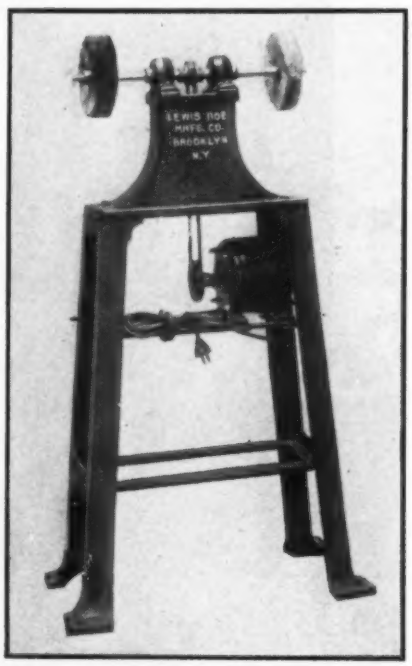
The riveter operates at 4,000 to 6,000 r.p.m., and has frame travel of approximately 2 in., throat depth of 5 in., with a 4 in. frame adjustment on the post to accommodate various sizes of assemblies.

Hercules Solenoid Electrically Operates Arms of Spot Welder

A solenoid has been designed by Hercules Electric & Manufacturing Co., 2416 Atlantic Ave., Brooklyn, N. Y., for electrically operating the arms of spot-welders. Pushbutton control of arm closing is provided, eliminating the need for foot-pedal action on the part of operators.

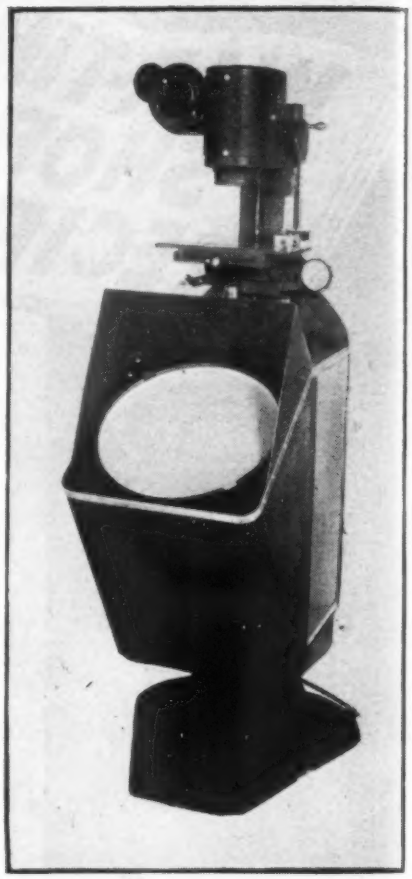
It is said that the development insures uniform spot-welds automatically by producing greater pressure on the electrode arms and by uniform pressure at all times. This solenoid can be attached to all makes of spot-welding machines. Units can be provided with or without automatic timers.

Roe Polishing Machine For Light Buffing Work



Lewis Roe Manunfacturing Co., 1042-1050 DeKalb Ave., Brooklyn, N. Y., has available a polishing machine designed for light buffing and coloring work. This machine is driven by a ¼ hp. a.c. or d.c. motor mounted on the stand. It weighs 100 lb., and can be moved about the shop.

It is equipped with two self-aligning ball bearing pillow blocks, and has a ¾ in. diameter spindle 22 in. long. Longer spindles can be supplied if desired. The spindles are turned down at the ends to ½ in. diameter and threaded eight square threads to the inch. They are tapped for taper points which are furnished with the machine.



Portman P2-14 Comparator Provides Greater Capacity

Portman Machine Tool Co., 70 Mill Road, New Rochelle, N. Y., is making the Model Pa-14 optical comparator, which has greater mechanical capacity and larger dial faces on the indicators than previous models. The comparator is furnished with a 14½ in. diameter image screen. It measures 24×30×60 in., and weighs 400 lb.

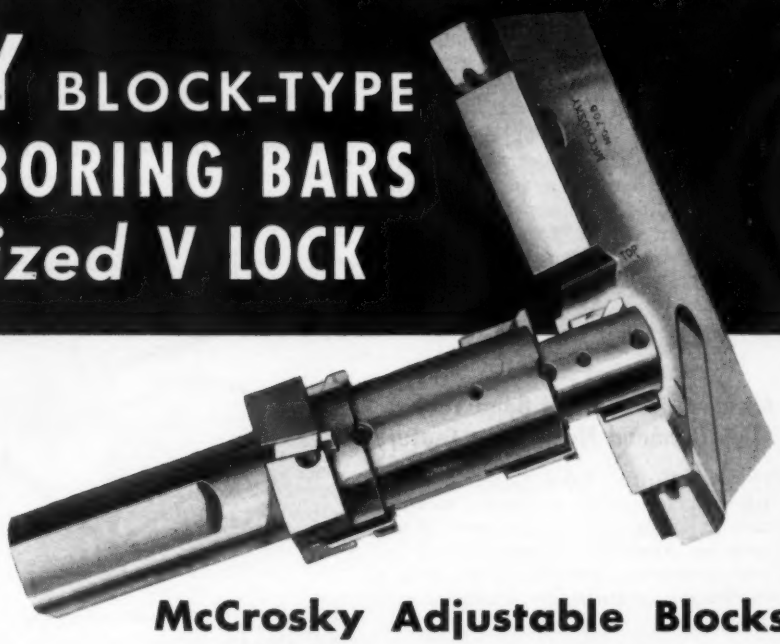
Another feature is the "shaft-of-light" blower cooled lamp housing. This housing includes a new type of condenser lens unit of larger size, mounted as an eccentric assembly within the housing. Provision is made for sensitive light beam adjustment under all operating conditions. Magnification lens units of 10X, 20X, 31¼X, 50X, 62½X and 100X are obtainable as standard equipment.

For use on production jobs or where coordinate measurements are not required, this model comparator may also be obtained with a plain work stage unit. Extra accessory equipment available includes surface illuminator attachments and two types of center stages.

Aero-Seal Hose Clamp Now Made in Small Sizes

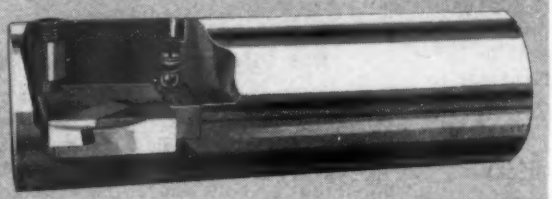
The Aero-Seal line of hose clamps, manufactured by Aircraft Standard Parts Co., 1711 Nineteenth Ave., Rockford, Ill., is now available in Models

McCROSKY BLOCK-TYPE ADJUSTABLE BORING BARS *with Centralized* V LOCK



3 features that improve and protect production

1. Block is located in bar with extreme accuracy.
2. Amount of block float for finishing cuts can be closely controlled.
3. Blocks of different cutting diameters can be interchanged in bar without removing centering key.



How Block is Centered and Locked in Bar

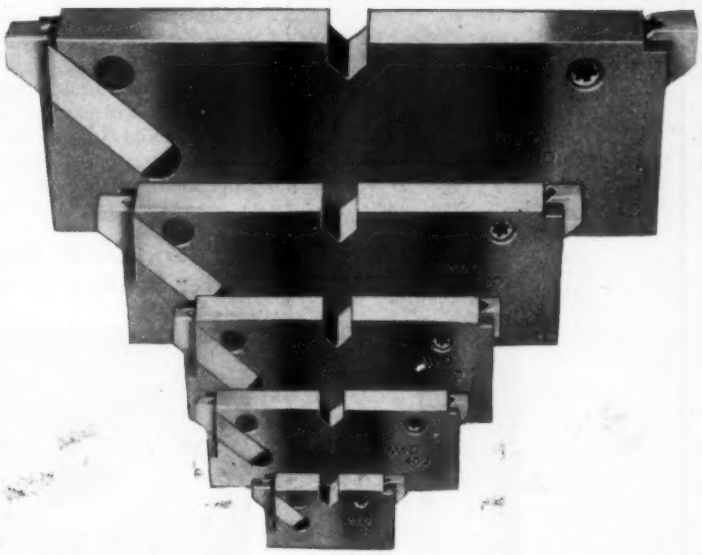
Middle section of centering key is a tapered "V" that engages a complementary "V" in cutter block. The headless screw at top of key advances or retracts key in bar. Advancing screw brings key into firm contact with "V" of cutter block, centering block accurately and locking it positively. Retracting screw allows block to float. Cutter block can be easily removed from bar after hardened thrust block has been removed, and another block can be inserted, all without removing the centering key.

Standard and Special Bars

Standard bars for holding McCrosky Adjustable Blocks are made in four styles: turret type bars with straight shanks and with taper shanks; piloted bars with straight shanks and with taper shanks. McCrosky engineers will design for you special bars to meet the requirements of specific jobs.

For complete details ask for McCrosky Bulletin 16-B and the McCrosky Boring Bar Manual.

McCrosky Adjustable Blocks Made in Five Series



All block bodies are hardened. All blocks in the five series are offered in three styles: roughing, finishing, extended (for boring ahead of bar). Block thickness of each series is suited to range of cutting diameters handled by that series, each series covering a different range. Total range of cutting diameters covered by the five series is 1¼" to 15". Larger diameter adjustable blocks and solid facing blocks special to order. Standard blocks are fitted with high speed blades; cast alloy and carbide tipped blades special to order.

EST 1904
McCROSKY TOOL CORPORATION
MEADVILLE, PA

COST CUTTING TOOLS

Other McCrosky products: SUPER Adjustable Reamers, JACK-LOCK Milling Cutters, WIZARD Quick-Change Chucks, TURRET Tool Posts

M-6 and M-10 for hose sizes from ¼ to ⅝ in. inclusive. M-6 is designed for ¼, ⅜ and ½ in. hose, and the M-10 for ⅝ and ¾ in. hose. By using the extra take-up in the band, the M-10 clamp can be used on all five sizes of hose.

The band is made of spring steel strip perforated to correspond with the teeth of a worm gear. It is drawn through the housing by a worm thumbscrew. Since the perforations in the band extend for nearly 3½ in., the clamp may be taken up a full inch, on the diameter in all of the larger sizes to secure a tight fit.

Abrasive No. 15 Red Band Tool Has Diamond Numbering Feature

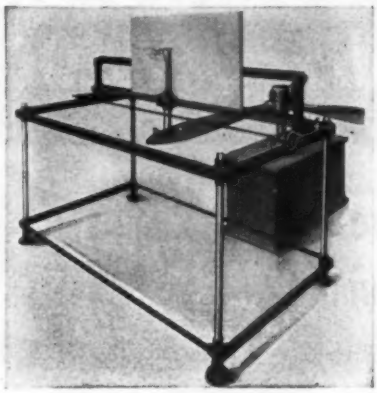
The No. 15 Red Band diamond dressing tool for large external, straight face grinding wheels has been developed by Abrasive Dressing Tool Co., 1560 Broadway, Detroit, Mich., with a numbering feature to eliminate the

danger of careless disposal of diamonds.

This tool contains 15 fine, whole, natural diamonds arranged in three layers of five each. The diamonds are spaced and staggered to provide maximum contact with the wheel at all times. A series of figures is stamped on the head of each tool to denote the total number of diamonds. As the tool is used, the number of diamonds remaining in the tool is indicated through each stage of wear.

Dupligraph Transfer Contour Of Irregular Object on Paper

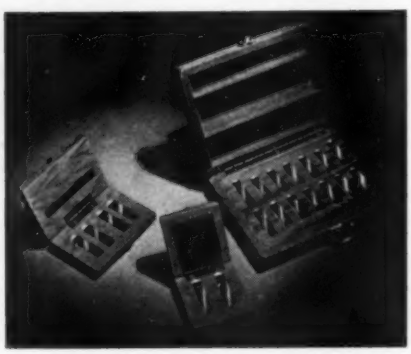
An instrument, called the Dupligraph, has been designed by Inter-Lakes Engineering Co., 502 Transportation Bldg., Detroit 26, Mich. The device transfers on transparent paper the ex-



act contour of irregular surfaces, and will also transcribe the contour directly on metal.

Use of the Dupligraph is particularly advantageous for securing concave readings in forming dies which frequently cannot be checked with ordinary templets. This device gives cross-section lines relative to each other. This is usually done on vellum and checked against the draft or layout to eliminate chances for error in making comparisons.

Carblox Carbide Gage Blocks For Build-Up or Individual Use



Lincoln Park Tool & Gage Co., Lincoln Park 25, Mich., is manufacturing cemented carbide gage blocks called Carblox. They are furnished to "A" accuracy (0.000004 in.) and "B" accuracy (0.000008 in.) as a series of a gage block build-up, or as individual blocks.

The fourteen block set consists of two 0.050 in., two 0.100 in. and one each of 0.05005 in., 0.0501, 0.0502, 0.0503, 0.0504, 0.0506, 0.0507, 0.0508 and 0.0509 in. The 0.050 and 0.100 in. blocks are supplied in boxes in pairs as well as in combination.

A full build-up range of the standard 81-piece set of gage blocks is available when Carblox are used. For example, in a 0.4051 in. build-up, one 0.050 in. Carblox and one 0.0501 in. Carblox would be used with one ordinary 0.200 in. and one 0.105 in. gage block. Carblox in half-tenth (0.05005 in.) size further supplements regular gage block sets. Carblox are said to be practically non-magnetic and resistant to rust or corrosion.

Enthone Emulsion Cleaners Developed for Oil and Dirt

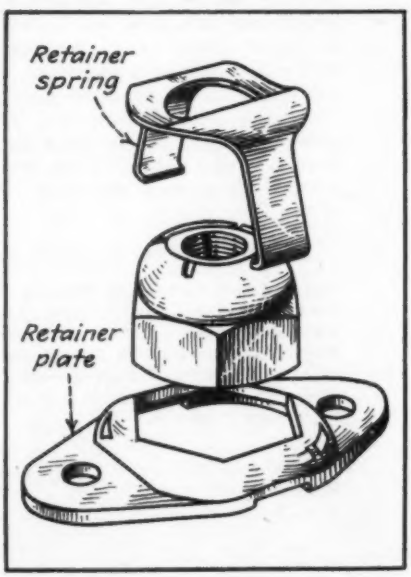
Enthone Co., New Haven, Conn., has developed an emulsion cleaner ready for use. It cleans oil, grease and dirt without attack on any basis metal including zinc, aluminum, brass, lead and steel, and has a flash point above 100 F. Work to be cleaned is swished about in the cleaner and then rinsed off in running cold water which emulsifies the cleaner. A short immersion in an alkaline cleaner following this prepares the work for finishing.

The company also has an emulsion cleaner concentrate which is a base of strong emulsifiers that is mixed with from nine to fifteen volumes of solvent naphthas and used in the same manner as the cleaner.

Both products are available in 5, 30 and 50 gal. drums.

Kaynar Nut and Bolt Retainer Has Interchangeable Feature

Kaynar Manufacturing Co., Los Angeles, Calif., has produced a nut and bolt retainer called Click. It is adaptable to any aircraft, marine or ordnance nut or bolt, and is interchangeable with other anchor fittings, except where slightly greater widths would cause interference. The unit consists of a retainer plate and spring, both of cadmium spring steel. Incorporating the features of standard anchor nuts, Click provides also a nut anchor that can be spot-welded to the assembly without affecting its serviceability. The unit may also be used as a bolt anchor



OF COURSE YOU ARE USING "THE BEST" CUTTING OIL

These people thought so... until—

QUAKER KUT #45 GAVE THEM 4½ TIMES AS MANY GEARS PER TOOL GRIND

OPERATION: Finish cut on Bevel Gear (20 teeth, 5 pitch, 14.5° pressure angle; 221 strokes per minute).
MACHINE: Gleason 12″ straight tooth generator.
STOCK: SAE 4615. Brinell 179.
OIL USED PREVIOUSLY: Nationally known chlorinated—fatty sulphur oil.
QUAKER BLEND USED: QUAKER KUT #45—1 part; Paraffine oil (Vis. 100″ @ 100°F.)—4 parts.
RESULTS WITH PREVIOUS OIL: Cutters averaged 8 pieces per grind. Also, honed cutters every 3 gears.
RESULTS WITH QUAKER BLEND: Cutters averaged 36 pieces per grind and still in good shape when stock ran out.

They thought so too... until—

QUAKER KUT #45 MADE POSSIBLE A 1500 PER CENT INCREASE IN TAP LIFE

OPERATION: Tapping 1½ NPT.
MACHINE: Automatic Tapper.
STOCK: 4140 Steel, Brinell 355—388.
OIL USED PREVIOUSLY: Nationally known chlorinated sulphurized oil used straight.
QUAKER BLEND USED: QUAKER KUT #45—1 part; Paraffine oil (Vis. 100″ @ 100°F.)—6 parts.
RESULTS WITH PREVIOUS OIL: Average 1 piece per tap.
RESULTS WITH QUAKER BLEND: Average 16 pieces per tap.

This plant likewise... until—

MILLING TOOLS LASTED 4 TIMES AS LONG, USING QUAKER KUT #45

OPERATION: Milling.
STOCK: Steel forgings: Rockwell "C" 32—"C" 36.
OIL USED PREVIOUSLY: Nationally known sulphurized chlorinated oil used straight.
QUAKER BLEND USED: QUAKER KUT #45—1 part; Naphthenic oil (Vis. 100″ @ 100°F.)—9 parts.
RESULTS WITH PREVIOUS OIL: Tools changed every day.
RESULTS WITH QUAKER BLEND: Tools changed every *fourth* day.

They changed their minds... when—

PIECES PER TOOL GRIND MORE THAN DOUBLED, USING QUAKER KUT #45

OPERATION: Broaching.
MACHINE: National.
OIL USED PREVIOUSLY: Nationally known sulphurized, chlorinated cutting oil used straight.
QUAKER BLEND USED: QUAKER KUT #45—1 part; Mineral oil (Vis. 240″ @ 100°F.)—1 part.
RESULTS WITH PREVIOUS OIL: 450 pieces per grind of tool.
RESULTS WITH QUAKER BLEND: 950 pieces per grind of tool.

QUAKER KUT #45 is one of the many *new type* products for the metal working field developed by Quaker's Research Laboratory. Fundamentally, it is the result of combining sulphur with fatty waxes not heretofore used in cutting fluids, and the *polymerization* of this substance under high pressure in the presence of a catalyst.

QUAKER KUT #45 is a concentrated "base" which, when blended with ordinary mineral oil, forms a new type of cutting fluid from which the combined sulphur is released very gradually . . . only to the extent required to prevent metal-to-metal contact . . . hence it remains effectively sulphurized for an extended period. It also possesses extreme pressure qualities and excellent lubricating, cooling and anti-weld characteristics. For more technical data and performance reports . . . or for the services of a *Quaker Process Engineer* . . . use the handy coupon below.

QUAKER CHEMICAL PRODUCTS CORP.
CONSHOHOCKEN, PA.

Other Plants in CHICAGO and DETROIT
Warehouse Stocks in Principal Industrial Centers

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TOOLS ARE WEAPONS

TREAT 'EM RIGHT!

FOR MORE TECHNICAL DATA, USE THIS

QUAKER CHEMICAL PRODUCTS CORP. • CONSHOHOCKEN, PA.

☐ Send me additional Production and Technical Data on QUAKER KUT #45.

☐ You may have a QUAKER PROCESS ENGINEER contact me to arrange a test run in our plant—**without cost or obligation to us.**

Name_____ Position_____

• • • • PLEASE PRINT COMPANY NAME AND ADDRESS IN MARGIN BELOW • • • •

using standard AN bolts. The conversion of nut plates to blind studs is permitted without tooling change while the part is in production.

With Click, stud retainers can be riveted or spot-welded early in production and the bolt inserted and locked in place with the retainer spring any time later. Attaching dimensions of this unit are held to 0.002 in., which eliminates line drilling of assemblies and allows prefabrication of holes.

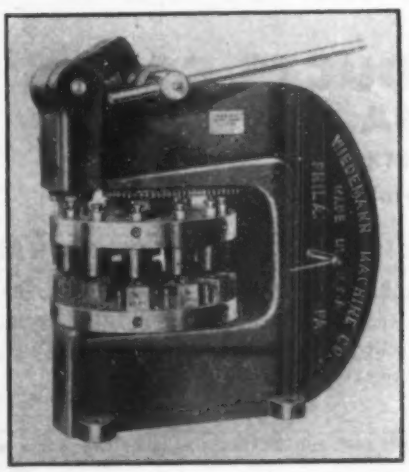
Reed Micrometers Now Have Vernier Reading to 0.0001 In.

All Reed micrometers in the 1, 2 and 3 in. sizes are being furnished by George Scherr Co., 128 Lafayette St., New York 13, N. Y., with vernier reading to 0.0001 in. instead of reading only to 0.001 in. as heretofore. This feature is in step with developments in manufacture which are calling more and more for measurements to closer limits.

Wiedemann Turret Punch Press For Short Run Metal Piercing

Wiedemann Machine Co., 1815-31 Sedgley Ave., Philadelphia, Pa., has available a hand operated turret punch press in two types for short run piercing of sheet metal. Type R-2 is suited for mounting on a bench or stand; while Type R-4 is mounted either on a stationary or portable stand. The equipment incorporates 11 or 12 punches and dies in a rotating turret. The 12-station turret carries any combination of punches and dies to and including 1¼ in. diameter, with hole capacities varying in thickness of ¼, 3/16 and ⅛ in. The 11-station turret carries up to and including 2¼ in. diameter punches and dies, with hole capacity of 1/16 in. thickness.

Type R-2 press measures 25½×12×23 in., and weighs 480 lb. Throat depth of this type machine is 12 in. Measurements of the Type R-4 are 54×31½×54½ in., with stand. It weighs 1,800 lb. Throat depths are 18, 24 and 28 in. Both models develop 15,000 lb. pressure by applying 140 lb. on the 30 in. handle. An indexing device controlled by a lever locks the turrets. When the turrets are unlocked, the ram cannot be lowered. This prevents the possibility of shearing the punch and die in case of carelessness.



An adjustable gage bar can be furnished for the Type R-4 to provide material supports that can be moved in and out to carry sheets. A rear gage bar is moved in and out by means of two leadscrews which are operated by a handwheel at the front of the machine. The gage bar is graduated each way from the center in 1/16 in. increments.

TRADE PUBLICATIONS

ABRASIVES Berh-Manning Corp., Troy, N. Y., has completed a booklet giving basic information on coated abrasives, and intended as a supplement to existing literature.

ALUMINUM-COATED STEEL American Rolling Mill Co., Middletown, Ohio, has published a booklet setting forth the qualities and characteristics of recently developed aluminuzed steel, including gage and weight limits, physical and chemical properties, corrosion and heat resistance, formability, weldability, paintability and advantages over either steel or aluminum.

COATING In a 24-page booklet prepared by American Rolling Mill Co., Middletown, Ohio, data is given on abrasion, friction, weather, chemical chipping and thermal shock resistance; color range and fastness; finishes; and physical properties of porcelain enamel. Design factors are discussed and physical properties are compared to other types of coating materials.

CONTROL Catalog A8 of the Automatic Temperature Control Co., 34 E. Logan St., Philadelphia 44, Pa. describes the design and operation of that firm's Type 303 valve operator, and presents tables of electrical data, force and torque information, dimensions and operating force.

CONTROLS Data and illustrations of electronic level controls for liquids and powders are presented in a folder offered by Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.

CORROSIVE FLUID HANDLING The Cochrane Corp., 17 St. and Allegheny Ave., Philadelphia 32, Pa., has issued publication 2985-A, describing a method of proportioning sulphuric acid and water supplies. The principle of operation is described fully, with its many advantages and applications.

CUTTING TOOLS Tantung Tool Catalog No. 227 tells how to grind and braze this non-ferrous cast alloy, gives performance data and shows the results obtained by its use in various machining operations. It is available from Vascoloy-Ramet Corp., North Chicago, Ill.

CUTTING TOOLS Firth-Sterling Steel Co., McKeesport, Pa., has adopted "Color-Branding" and a color chart to facilitate quick identification of the correct grade of sintered carbide cutting tools. A Firthite color chart for shop use is available on request.

CUTTING TOOLS Bulletin 143, just released by Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit 1, Mich., covers all grades and classifications of that firm's metals and gives prices on its standard cutting tools, standard blanks, solid tungsten carbide for boring tools and tungsten carbide center inserts.

DIAMOND TOOLS A circular issued by Champion Diamond Co., 551 Fifth Ave., New York 17, N. Y., illustrating, specifying and pricing the various types of diamond tools manufactured by that firm.

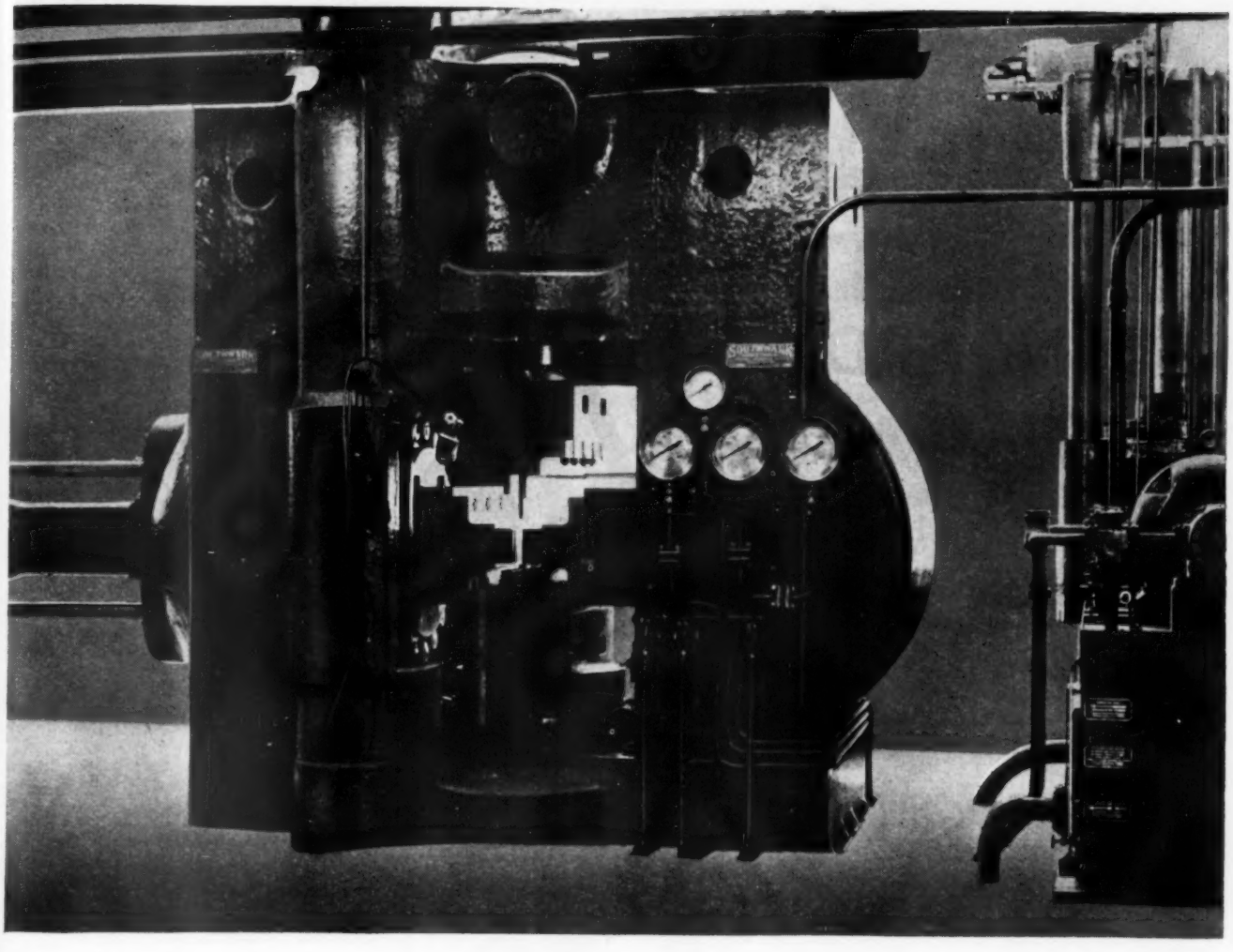
DRESSING TOOLS "Diamond Impregnated Dressing Tools" is the title and the subject of the second of a series of booklets illustrating and describing the complete line of diamond tools developed and manufactured by The Wheel Trueing Tool Company, Detroit 6, Mich. When issuance of the series of booklets is completed, they will fit into a leather cover binder supplied by the company.

DUST CONTROL The menace of industrial dust and an economical, efficient method of controlling and removing dust at its source is described in "Dust—the Silent Saboteur of Production," recently published by American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind.

EMULSION CLEANING The Enthone Co., New Haven, Conn., has issued a 4-page bulletin describing its emulsion cleaners and illustrating their use in the rapid cleaning of all types of base metals without attack.

FACILITIES The plant and production facilities of the Star Machinery Co., 1741 First Ave. South, Seattle, Wash., are pictured and described, along with some of the firm's products, in a recently released booklet.

GRAPHITE A 4-page illustrated bulletin, No. 431-AW, on "dag" colloidal graphite for impregnation and surface



It's U.D. for POWDERED METAL

Here is a powdered metal press especially constructed by Southwark for the purpose of insuring the U. D. (uniform density) of a compressed object. This is accomplished by compelling the upper and lower rams — each of 3000 tons capacity—to oppose one another and allow the powdered metal to be compressed from both the upper and lower dies.

Just another example of Special Machinery designed and constructed by Southwark engineers.

Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia, Pa.; Pacific Coast Representative, The Pelton Water Wheel Co., San Francisco, Calif.

BALDWIN
SOUTHWARK
HYDRAULIC PRESSES

Division THE BALDWIN LOCOMOTIVE WORKS, *Philadelphia, Pa.*

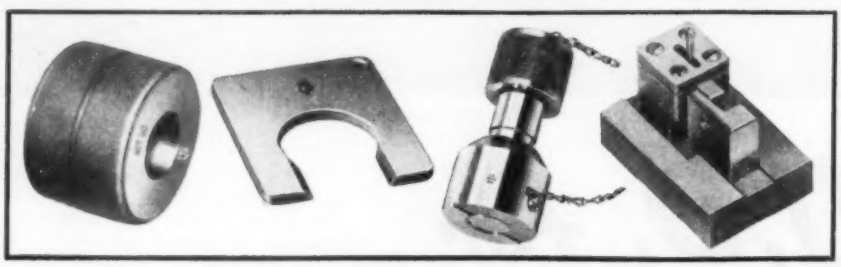
RUSH DELIVERIES can be made on TURNER STANDARD STEEL *Plug* GAUGES!

Now your rush orders on Turner's standard steel plug gauges can be delivered within a few days—that's how Turner has stepped up their production to meet your demands for faster delivery. And here is how to order them by giving us the following information: 1. Diameter; 2. Length of gauging surfaces; 3. Tolerance or accuracy; 4. Hardened alloy steel or chrome; 5. Number of members—Go, Not Go, Handles; 6. Complete marking instructions.

33⅓% discount off list prices!

Prompt delivery can be made on rings, snaps, flush pins and built-up gauges too. For the latest delivery dates write us today.

FAST DELIVERIES ON THESE TOO!



Wire your order today

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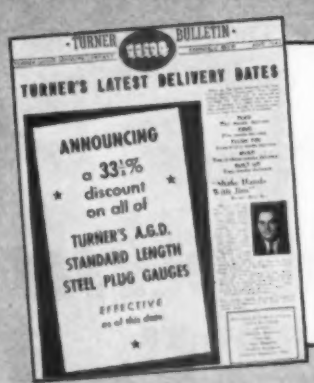


Send for this BULLETIN *today*

This Turner Bulletin gives you the latest delivery dates on all Turner gauges. Write for it today (on your company stationery please).

coatings has been released by the Acheson Colloids Corp., Port Huron, Mich.

HOLE GAGES An instruction booklet for setting and using model 1201 series of dial indicator hole gages has been issued by Federal Products Corp., 1144 Eddy St., Providence, R. I. The booklet is only of interest to people who use this particular gage in their shop.

INSTRUMENTS Yarnall-Waring Co., Chestnut Hill, Philadelphia 18, Pa., offers bulletin WG-1820, in which are described the mechanism and the methods of installation of the company's remote water-level indicator.

MARKING Various devices and machines for marking industrial products are described and illustrated in a 44-page catalog issued by Superior Type Co., 1800 W. Larchmont Ave., Chicago, Ill.

METAL CLEANING Data on acid-detergent techniques designed to remove many special types of deposits from ferrous and non-ferrous parts during fabrication, is given in a 12-page instruction manual issued by Oakite Products, Inc., 22 Thames St., New York, N. Y.

METAL CLEANING A 32-page catalog and manual issued by the Howard Engineering and Mfg. Co., 1801 Freeman Ave., Cincinnati, Ohio, supplies data on applications for metal cleaning and finishing machinery. Problems involved in cleaning and finishing metal parts are described and illustrated in detail.

MAGNETIC PULLEYS The operation and maintenance of magnetic pulleys is the subject of a 40-page handbook published by the Dings Magnetic Separator Co., 509 E. Smith St., Milwaukee 7, Wis. Featured is information on trouble shooting, trouble prevention, repairs, recommended operating practices, and general maintenance.

PNEUMATIC POWER Comprehensive data presented in a 92-page catalog enables selection of the proper air cylinder for any pneumatic power movement. Drawings and specifications are shown for 112 different air cylinders, included in seven standard styles and also double end rod type cylinders. The catalog is available from The Tomkins-Johnson Co., Jackson, Mich.

PRECISION EQUIPMENT Catalog No. 836, issued by The Challenge Machinery Co., Grand Haven, Mich., describes and pictures its line of precision equipment for tool and machine industries, including layout surface plates, reading and checking tables, cast-iron top work benches, lapping plates, straight edges and angle irons.

PRODUCTION FACILITIES Merz Engineering Co., Indianapolis, Ind. has issued a portfolio describing and picturing its "Four Spheres of Service to American Industry."

PUMPS Joshua Hendy Iron Works, Pomona Pump Co., Div., St. Louis, Mo., has issued a catalog presenting complete information on the various types of Westco industrial pumps produced by that firm.

SAFETY A series of safety signs for lift truck operators has been prepared by and is available from Towmotor Corp., 1226 East 152nd St., Cleveland 10, Ohio. Bold letters carry such warnings as "Caution: Low Head Room," "Slow: Narrow Aisle Ahead," "Slow: Blind Corner," and "Stop: Crossing." Lift truck routes are also indicated.

SWITCHGEAR Type MI-9 switchgear with magne-blast air circuit breakers, for up to 5000 volts and 50,000 Kva, is described and installations pictured in bulletin No. 7300 issued by the General Electric Co., Schenectady, N. Y.

SWITCH PANELS The G-E Cabinetrol, a new, simplified system for providing motor control for complex industrial processes, is the subject of a 24-page illustrated bulletin (GEA-3856) recently issued by the General Electric Co., Schenectady, N. Y.

TRANSFORMERS Bulletin No. 43-AT of the Eisler Engineering Co., 740-770 S. 13 St., Newark, N. J., describes that firm's air-cooled transformer, includes illustrations of various models and gives specifications.

TUBE CUTTING De Walt Products Corp., Lancaster, Pa., has issued literature describing its tube cutting machine.

TURNSTILES A new booklet, "Counting People Accurately and Automatically," issued by Perey Manufacturing Co., 101 Park Ave., New York, N. Y., contains information on the subject of counting moving masses of employees.

VALVES The Edward Valve & Manufcaturing Co., Inc., 1220 W. 144th St., East Chicago, Ind., has issued a booklet describing and picturing its line of steel stop, check, blow-off and non-return valves.

VIBRATION The theory and application of vibration control to stationary and marine equipment are discussed in catalog G-100 issued by Korfund Co., Long Island City 1, N. Y.

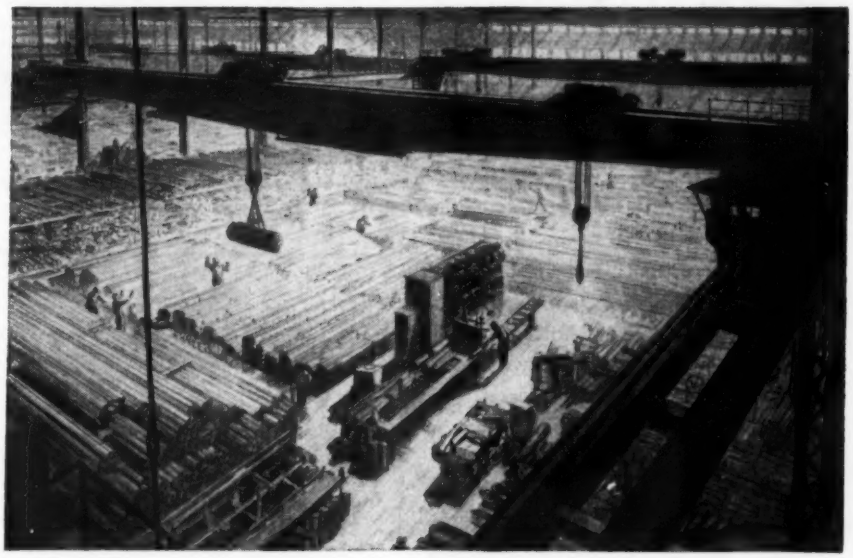
WELDING A recently-completed contribution to the war production program is the new motion picture, "Welding Stainless Steel," prepared by and available from Allegheny Ludlum Steel Corp., Brackenridge, Penn. This two-reel film, which takes about

War Production Relies On Warehouse Steels

Literally thousands of kinds, shapes and sizes of steels must be immediately available for industry if the nation's war production and other essential industries are to function efficiently. Warehouse distributors, who normally carry steels in stock as a peacetime enterprise, today find themselves in a position of strategic importance . . . serving all industries, and making every piece of steel count for victory.

The recent "Share the Steel" campaign launched by the WPB calls on companies to cut their inventories to a minimum and release idle steel stocks . . . hoping to gain some 2,000,000 tons of steel urgently needed now in war production. This plan places double importance on those organizations such as Joseph T. Ryerson & Son, Inc., who carry steel in stock for the use of all industries.

(See Advertisement)



STEEL—In Ryerson Stock *for Immediate Shipment*

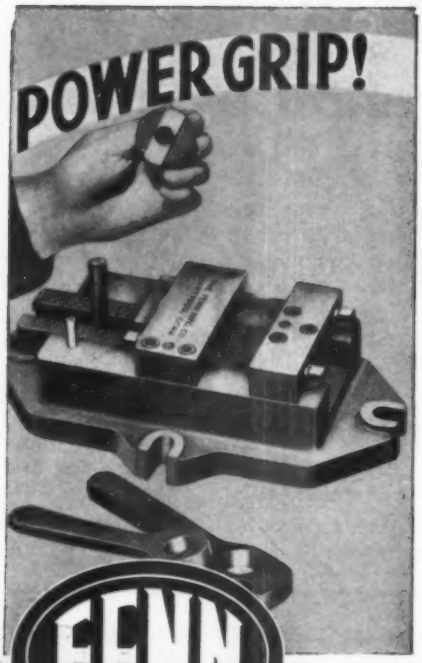
Pictured above are steel stocks in one of the ten Ryerson plants. Ready for immediate shipment are thousands of kinds, shapes, and sizes of steel to fill the requirements of war industries and the manufacturers of essential civilian goods.

Rush orders, equipment breakdowns as well as the normal demand for small lots of steel make it highly important to have a source ready with the right steel to meet all emergencies.

The ten Ryerson Steel-Service plants are geared for just this operation. The steel carried in Ryerson stock makes it practical for manufacturers to reduce high inventories—eliminate idle steel and make every ton work for victory. Call your nearest Ryerson plant when you need steel.

JOSEPH T. RYERSON & SON, Inc.

Steel-Service Plants at: Chicago, Milwaukee, St. Louis, Detroit, Cincinnati, Cleveland, Buffalo, Boston, Philadelphia, Jersey City



FENN

QUICK ACTION VISES

The Illustration Tells The Story

SERRATED surfaces both on sliding jaw and clamp bushing of the Fenn Vise give positive holding security. No possible chance of work slipping with this gripping feature. No shearing strain on clamp bolt either—only tensile strain for which it is amply heavy. Note the serrated surfaces. Note that they mesh perfectly — uniformly — yet can be instantly released for quick adjustment to other work. Note bolts for holding special jaws; quickly adapted for holding work without slipping, no matter what shape.

Used in these industries:

Airplane Engine Parts
Machine Gun Compensators
Machine Gun Parts
Automobile Parts
Refrigeration Parts
Electrical Equipment
Tool Making
Precision Instruments
Special Jobs and Accessories
And any small-parts production

Send for Bulletin No. 10

THE FENN MFG. CO.
HARTFORD, CONN.
ESTABLISHED 1900

25 minutes to show, will be sent without charge, express prepaid, upon valid request by companies, trade or technical groups, industrial school or colleges, etc.

WELDING Allegheny Ludlum Steel Corp. has published a 64-page book, which presents in colored 3-dimensional drawings, charts and illustrations interpreting the techniques commercially employed, and the precautions to be observed, in the welding of stainless steel. Copies of "Welding Stainless Steel," are available to fabricators, students, workers or others interested, upon request to the company at 2319 Oliver Bldg., Pittsburgh 22, Pa.

WRENCHES A new wrench catalog, No. 243, especially designed for busy war-time buyers, has been issued by the Blackhawk Mfg. Co., Milwaukee 1, Wis.

X-RAY Two folders issued by North American Phillips Co., Inc., Industrial Electronics Div., 419 Fourth Ave., New York, N. Y., describe that firm's electronic inspection device, "Searchray 80."

NEW BOOKS

THE PHYSICS OF METALS—*By Frederick Seitz, professor of physics and department head, Carnegie Institute of Technology. 330 pages. Published by McGraw-Hill Book Co., 330 West 42 St., New York 18, N. Y. $4.*

A non-mathematical treatment of the physics of metals, this book treats of developments in the past 15 years. Although the points of view is that of an atomic physicist, the lectures upon which this book is based proved of interest to metallurgists as well as graduate students in physics.

In laying the groundwork for a concept of modern physics as applied to metals, Prof. Seitz leads off with the theory of atomic arrangement in metals and of crystalline structures, relating this information to pure metals and alloys. The physical form of alloys, elastic properties of crystals and alloys are discussed in later chapters.

Thus, for approximately two-thirds of the book, the author uses in the development of the physics of solids only those concepts of the atom that may be formed from an examination of crystal structures. These concepts do not provide the answers to many questions; for example, why some metals alloy and others do not, why some are good conductors and others are not. Knowledge of atomic structures has grown recently to such stature that many such questions can be answered satisfactorily. Therefore additional chapters on atomic theory are related to the electron, the theory of light,

designed for time saving

Quick-precision shimming with Laminum often cuts assembly time 20 to 30%. Is introduced without fuss ... also eases shop, maintenance and service routine.

Shims cut to your specifications. Stock shim materials obtainable from your dealer. Write us for further information and shim application chart.

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wave theory, electron theory of metals, band theory of solids, cohesion of solids, alloys, and the magnetic and electrical conductivity of metals.

•

MACHINE SHOP PROJECTS FOR TRADE, VOCATIONAL AND HIGH SCHOOL SHOPS — *By Roy E. Knight, machine shop instructor, Senior High School, Connersville, Ind.* 112 *pages. Published by McKnight & McKnight, Bloomington, Ill.* $1.

Fifty projects tested for adaptability to average school shop equipment are included in this paper-bound book. Each project consists of a well-prepared blueprint on a left-hand page and an operation sheet on the facing right-hand page. Most of these projects are designed so that various operations can be performed on any of several machines. Hence the instructor and the student will work out the order of operations for each shop set-up.

The purpose of these projects is to cover the major machine shop operations during the duration of the course, to create in the student a desire for good tool design by making articles that will largely prove useful to him in further trade study or work. Thus the projects cover the making of a machinist's hammer, depth gage, parallel clamps, V-blocks, toolmaker's vise, tap wrench, angle plate, surface gage, ring gage, plug gage, mandrel, crotch center, lathe centers, drill press vise, jack screw, bending jig assembly and gear blanks. The course promotes an acquaintanceship with various materials and blueprint reading in addition to teaching the student how to setup and handle various machine tools.

•

PATENT LAW—*By Chester H. Biesterfeld, member of the New York State Bar and of the Bar of the District of Columbia.* 225 *pages. Published by John Wiley & Sons, 440 Fourth Ave., New York.* $2.75.

Written for the use of chemists, engineers and students, this presentation of patent law outlines the basic principles of the subject and supports them by citing leading cases and recent court decisions. The volume is timely in that it notes the recent trends in regard to invention which have resulted in materially higher standards than those which prevailed a decade ago.

Courts are particularly desirous to prevent the use of the patent system as a lever in supporting monopolistic practices. About 80 to 90 percent of the patents coming before them in recent years have been held invalid.

The author has prepared the volume on patent law from lectures given as an extension course for students at

Quicker DELIVERY

SET NO. 81

...on all DEARBORN GAGE BLOCK SETS

FREE This booklet shows you how to make your gage blocks last longer. Write for it today (on your company stationery, please).

The Dearborn Gage Company, Originators of Chromium Plated Gage Blocks are now in a position to make reasonably fast deliveries on all their standard gage block sets. This improvement in delivery is the result of Dearborn's increased production facilities during the past few months. If you need gage blocks in a hurry, wire or write us today for our latest delivery dates.

DEARBORN GAGE CO. 22035 BEECH STREET DEARBORN, MICHIGAN

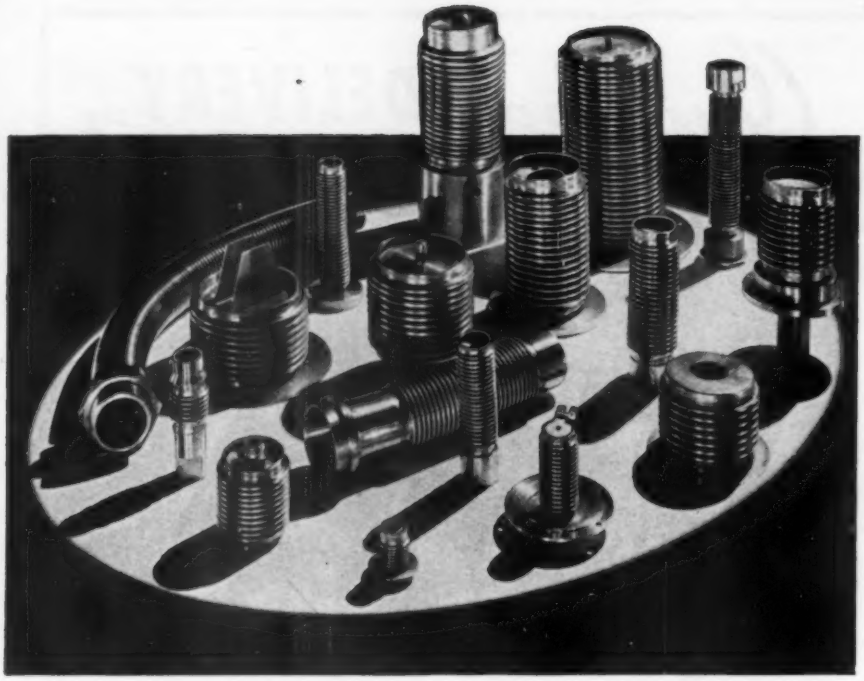
Originators of Chromium Plated Gage Blocks

3 STANDARD DEGREES of Accuracy Offered

W —OR "WORKING SETS"
"W" accuracy is a guaranteed tolerance of ±.00008 inch per inch or fraction thereof, of gage.

I —OR "INSPECTION SETS"
"I" accuracy is a guaranteed tolerance of ±.000004 inch per inch or fraction thereof, of gage.

L —OR "LABORATORY SETS"
"L" accuracy is a guaranteed tolerance of ±.000002 inch per inch or fraction thereof, of gage.



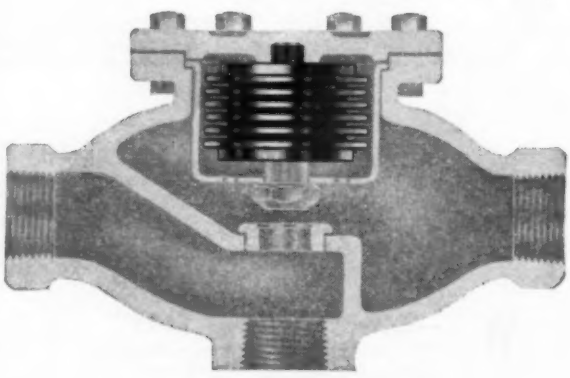
CMH

Stainless Steel Bellows

Wherever stainless steel's corrosion resistant qualities and temperature values are required in bellows service, CMH unimetal **circular seam welded** assemblies are filling that need.

No Solder or Flux Required

Long lengths of CMH Bellows are standard production; strength is further enhanced with **multiple ply** assemblies when needed.



Ask for engineering recommendations on specific applications.

CHICAGO METAL HOSE CORPORATION

General Offices: MAYWOOD, ILLINOIS

Factories: Maywood and Elgin, Illinois

the University of Delaware. Its value lies in its interpretation of the present status of the patent system to those who do not possess legal training.

SIXTY YEARS AGO

(From the pages of AMERICAN MACHINIST, November 10, 1883)

Conscious of the awakening national interest in culture, mechanics were instrumental in arranging the establishments of evening schools throughout the country, where young men might "improve themselves in the scientific branches of the arts they are learning."

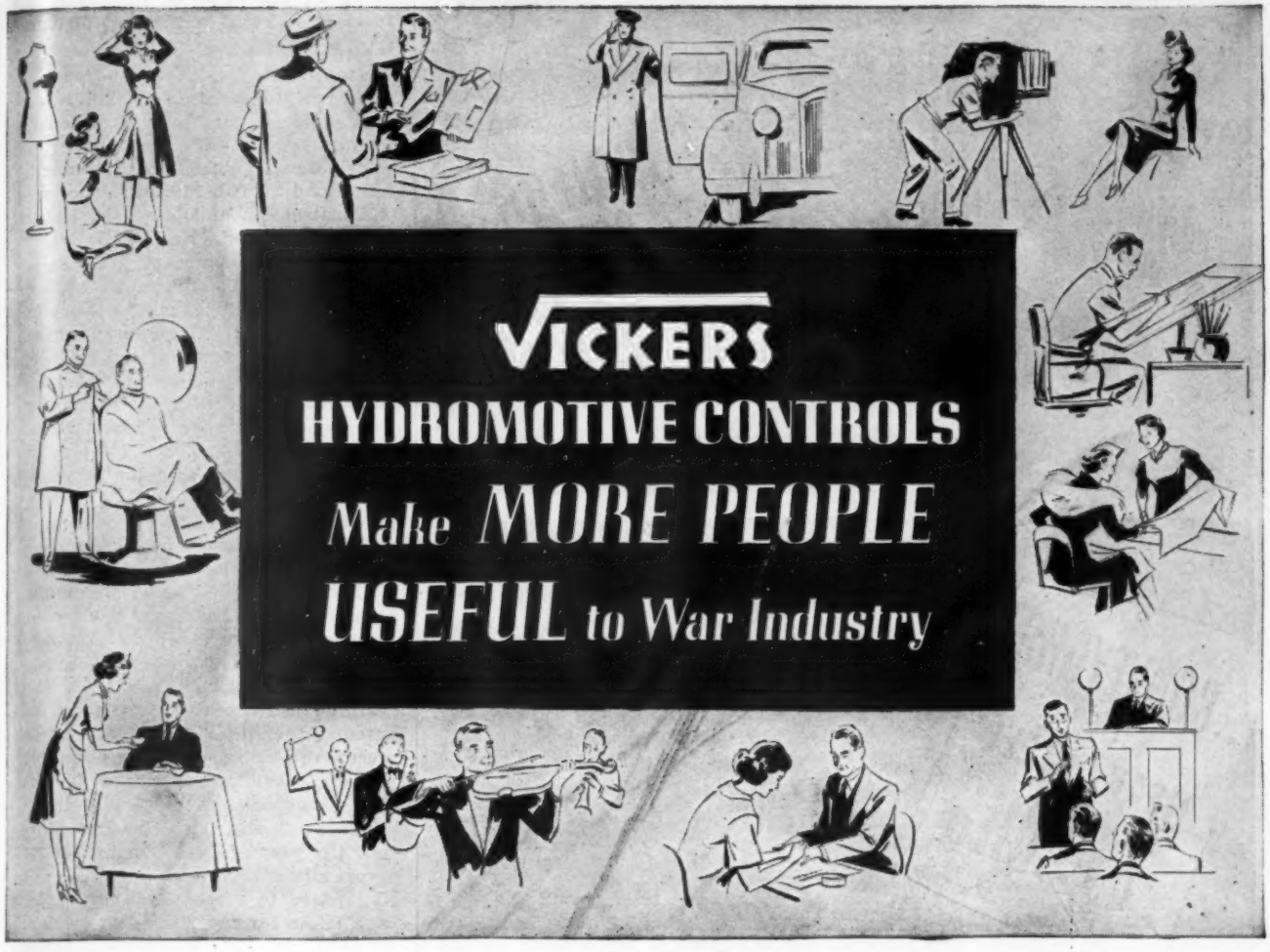
Immigration to the New World was still of enough interest to draw an editorial condemning the "extremely defective methods of ventilation used to supply fresh air to the thousands of persons confined under deck." It was suggested that the "air needed to supply the furnaces with oxygen might be drawn evenly from all parts of the hold, thereby inducing a movement of fresh air to the points which now suffer chronically from bad ventilation."

New York State voters were urged to vote for the abolition of the "contract system of labor from penal institutions throughout the state. The labor of several thousand prisoners is jobbed out to a few favored contractors at from 25 to 65 cents a day for each man, the State boarding, clothing and sheltering the convicts, besides furnishing free shops and power for the contractors' use. Manufacturers and mechanics must suffer this unwarranted opposition as long as the odious contract system is allowed to stand."

A struggle was going on between Great Britain, Germany and France for the machinery trade of Brazil, with extended periods of credit as the main competitive inducement. "Should United States manufacturers step into the conflict, we expect to learn that sales will be made for machinery to be paid by the heirs of the buyer."

Nor was AMERICAN MACHINIST of 1863 limited strictly to matters of metal working and tool building: under "Literary Notes" appears a paragraph describing "Worthington's Annual for 1884," as containing "a series of interesting stories, biographies and papers on natural history for the young. It has over 300 fine engravings and is every way a creditable book."

As a commentary on the manners—and snobbery—of the times, we read: "The Cleveland, Columbus, Cincinnati and Indianapolis Company has five cars in the shops to be remodeled. It is said to be the object of the company to place a smoking department in each car, so that first-class passengers will



Lawyers—manicurists—barbers—waiters—salesmen—housewives—all sorts of people must be used by industry to meet the critical manpower shortage. These people are usually entirely unfamiliar with machines and shops. Before they are useful in production, their sense of strangeness and their lack of self confidence must be overcome . . . and they must be taught to run a machine.

A complex machine makes the training task extremely difficult. It is much easier with machines equipped with Vickers Hydromotive Controls.

When one of these people is shown a Vickers controlled machine—shown how simple the controls are—how easy it is to produce good work, his strangeness and lack of self confidence are quickly overcome. It becomes much easier to train him to useful production needs.

With Vickers Hydromotive Controls, most of the required skill can be built into the machine. Complex operations can be reduced to simple routines or made automatic. Controls can be interlocked so it is impossible to do the job wrong. Exact load limitations are easily applied.

Discuss "hydraulics" for your machines with a Vickers Application Engineer.

VICKERS *Incorporated* • **1410 OAKMAN BLVD.** • **DETROIT 32, MICHIGAN**

Application Engineering Offices:

CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • NEWARK • PHILADELPHIA • ROCKFORD • TULSA • WORCESTER

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

Standard Conveyor Engineers Have the Engineering Skill and Manufacturing Facilities to Build For a Variety of Needs

One of the largest and most notable pneumatic tube systems ever built — serving 27 departments at Bell Aircraft with swift transmission of important papers — is an outstanding example of Standard Conveyor engineering and manufacturing ability.

A complete roller conveyor system for the handling of heavy sheet-steel coils, weighing several tons each, in a large eastern mill is another noteworthy Standard Conveyor installation.

These highly diverse examples are indicative of Standard Conveyor engineering versatility and manufacturing skill. An experience record of more than 35 years, serving all classes of industry and business, qualifies Standard Conveyor to be of service to your company — on any conveyor requirement, large or small, for immediate or future handling needs.

Write for valuable reference book—"Conveyors by Standard" — Catalog No. AM-11.

STANDARD CONVEYOR COMPANY
General Offices:
NORTH ST. PAUL, MINNESOTA
Sales and Service in All Principal Cities

★ ENGINEERED FOR FASTER PRODUCTION ★

not be obliged to go in the smoking-car among second-class passengers to smoke."

General articles included drawings and descriptions of the Chandler & Silver water motor "so constructed as to automatically vary the capacity of the cylinders to meet the requirements of the load;" "The Milling Machine — Its Construction and Use," the eighth of a series of papers by John J. Grant; and "The Computation of Bevel Wheels," by Hugo Bilgram.

"A good field for business is opening in Mexico for machinery of all kinds," a short item advised. "Every mile of railroad opened accelerates the demand for agricultural and mining machinery. Makers of steam pumps will soon be called on to provide means for draining valuable mines of water."

In the seven pages of advertising in the 16-page issue were included spaces devoted to: Cleveland Twist Drill Co.; the Nicholson File Co., "sole manufacturers of files and rasps having the increment cut"; and Pusey & Jones Co., "builders of steam engines and heavy iron work generally." The Westinghouse Machine Co. advertised "automatic engines, 30 to 300 horse power; throttling engines, 4 to 100 hp.," while William Sellers & Co. offered "machine shop and railway equipments," and The Gardner Governor Co. presented the virtues of its compensation governor.

Compared to present-day standards, space taken by advertisers was small, and averaged 21 advertisers to each 10½×15 in. page.

Make It Clear

BY E. J. COLE, JR.
National Blue Print Company, Chicago

When you pick up your pencil to make a sketch or a tracing, try to visualize the end use of the drawing you are about to make. It is not improbable that some of our men in the various theaters of war may shortly be reading prints made from this drawing.

If it is not clear and readable the results may be the loss of time and even of lives. In such cases the fellows with the heavy end of the job to do will damn the man who made the print whereas the real fault was with the man who made the drawing simply because he did not use the proper kind of paper, pencil, and exercise the proper care in making the original.

Be fussy about the paper you use for drawings and tracings and do not balk at the price of good paper that is guaranteed not to change its characteristics under extended conditions of heat, light, atmosphere and age. When one considers the amount of labor that is put on a drawing, the cost of the paper is really insignificant.

It's "WORK TO WIN"

AS WYCKOFF WOMEN WORKERS "MAN" VITAL PRODUCTION POSTS

More and more steel,—faster . . . *faster!* Doing a good job and doing it consistently, is how women workers at Wyckoff respond to America's urgent steel production needs—while Wyckoff men push on at fighting fronts.

WYCKOFF DRAWN STEEL CO.
FIRST NATIONAL BANK BUILDING, PITTSBURGH, PA.
3200 SO. KEDZIE AVENUE, CHICAGO, ILL.
WAREHOUSES IN PRINCIPAL CITIES Manufacturers of Carbon and Alloy Steels . . . Turned & Polished Shafting . . . Turned & Ground Shafting . . . Wide Flats up to 12" x 2"

Typical pages from reports made following a "Cost Patrol" study.

Report A—19.97 minutes per piece saved.

Report B—7 minutes per piece saved.

Report C—68 minutes per piece saved.

PRODUCTION NOTES

New Production Developments One Aim as Camco Teams Up Diecasting Machines With Automatics

CLEVELAND, O. . . . The Cleveland Automatic Machine Company of this city now has a full fledged and active companion line of production machines to augment the automatic screw machines and single spindle automatics which have been its principal manufacture for more than half a century. Following an engineering and market study of immediate and post-war production developments, Camco acquired the G & N line of diecasting machines, which is now in full production in the Cleveland factories of this company.

Under modern production methods many operations in which die-casting has been found effective are closely parallel in final result to certain types of work produced in automatic turning and forming operations. The manufacture and sale of these two types of production machinery by the same organization, thus proves to be an important forward step in the distribution of machine tools for their most effective use.

Greater Possibilities Ahead

Camco sales representatives and engineers who have made a specialty of parts production are in a position to perform a useful service to manufacturers in helping them to work out the right combination of production machinery for fast, economical, practical production.

The die-casting industry, old and established though it was, had really little more than scratched the surface of its vast possibilities when the impact of war production needs greatly accelerated certain advancements that were on the way. New uses for die-castings were perfected in a period of months that might have been years in development under normal conditions.

In adding this already successful line of high-pressure hydraulic die-casting machines to its manufacture, The Cleveland Automatic Machine Company aims at maintaining this accelerated rate of development in die-casting usefulness. The type of machine now being manufactured by Camco has many features contributing to this aim, features which the company naturally is interested in bringing to the attention of everyone actively interested in die-casting production.

Better To Write

Contacts are being made as rapidly as possible, but under present conditions it would be a long time before the available manpower in the sales and technical divisions could personally lay their information before everyone in the industry who should have it. Camco strongly urges, therefore, that anyone interested in getting this up-to-date information promptly write to the Cleveland office, so that their names can be moved up for immediate attention.

Write to . . . The G & N Manufacturing Company, Division of The Cleveland Automatic Machinery Company . . . 2269 Ashland Road Cleveland, Ohio. . . .

(Advertisement)

CLEVELAND *Single Spindle* **AUTOMATICS**

MODEL A—Built in 9/16-inch to 9 1/2-inch capacities
MODEL B—Built in 9/16-inch to 2 1/2-inch capacities

Tool — FOR MANAGEMENT

CLEVELAND'S Single Spindle Automatic has established a reputation, not only as an outstanding machine tool in individual performance, but as a particularly fine "tool for management". By management we mean clear across the board from production men to presidents—anyone whose headache it is to produce, to profit, and to maintain employment.

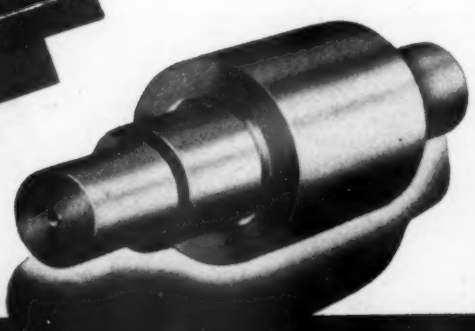
This is true because the very essence of Cleveland design is unending search for the last word in elimination of waste motion and material in production. With every Cleveland has gone (in addition to modern development of the tool itself) full benefit of the advice and counsel of engineers whose years of specialization have made them authorities on methods.

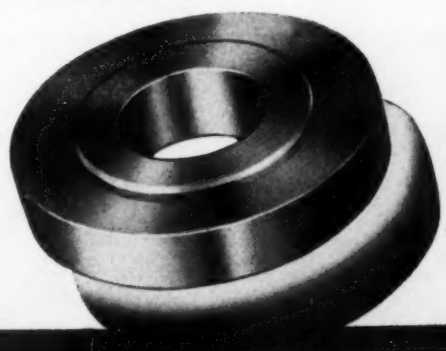
This advice and counsel now are made available to *all* management, whether owners of Clevelands or not, in a new service. We call it a "Production Cost Patrol" because its purpose is to help your production men "police" methods for all possible improvement. The steps are simple . . .

1. Upon request you will be given a statement in detail of the engineer's method of surveying your plant, and his credentials will be submitted.
2. The engineer will spend as much time as necessary in your plant, making detailed studies of operation without interrupting production or making demands upon the time of your organization.
3. A detailed written report will be made for you, with proposals for changes in method wherever opportunities for savings are found.

Proposals for improved method are by no means limited to cases where the savings can be made on Clevelands. In many studies made by Cleveland engineers new methods involving substantial savings have been found for the equipment already in use. In any event there is no charge.

If you have a rush problem, a collect wire will bring prompt consultation.





THE CLEVELAND AUTOMATIC MACHINE COMPANY

CLEVELAND, OHIO

SALES OFFICES

CHICAGO: 1408 Civic Opera Building
DETROIT: 540 New Center Building
NEWARK: 902 American Insurance Building
CINCINNATI: 1315 American Building

Standardize Now on for Easier Postwar Retooling

"We have been using Black & Decker Tools for five years . . . STANDARDIZED ON THEM . . . making possible quick replacements and better repair parts service . . ."

THE manager of an eastern shipyard refers to the Black & Decker Portable Electric Drills, Nut Runners, Screw Drivers, Saws, Sanders and Lectro-Shears now helping to speed production, save time, raise worker craftsmanship on a huge boat building program.

Other war producers think likewise: "You can't have too many such all-around tools," says one. "Repeat purchases of B & D Tools for over 14 years indicates what we think of them," says another. "With minimum care, they give excellent service–always dependable," from another. The pictures here show why today's war producers—relying heavily on America's favorite electric tools—are planning to standardize on them for their postwar retooling programs. They show, too, typical examples of American "free enterprise" at work . . . of close cooperation between manufacturer and tool supplier . . . of men pooling their experience and ingenuity to turn out "what it takes to win" faster and better.

Smart production men know the complete Black & Decker line offers the *right* tools for every job . . . that standardizing on Black & Decker Electric Tools means convenient interchangeability of parts . . . that 26 Factory Branches offer quick replacement parts and repairs . . . that close-at-hand Distributors offer expert help on retooling problems. It will pay you, now, to keep posted on B & D Electric Tools as part of your postwar planning. The Black & Decker Mfg. Co., Dept. 716, Towson 4, Maryland.

LEADING DISTRIBUTORS ARMY E NAVY EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

DRIVING screws into framing of motor patrol boats with Black & Decker Scrugun goes 10 times faster than by hand. Scruguns are used to drive a wide variety of wood and self-tapping screws, machine screws and nuts on high speed production schedules.

CUTTING galvanized iron sheets for coal bin linings with Black & Decker Lectro-Shears. These Shears follow straight, curved or irregular lines easily and accurately because the cutting operation is always fully visible to the Lectro-Shears operator.

Black & Decker Tools

*"**NEVER** been able to stall this Black & Decker Drill—one of the most useful tools here," says shipyard operator of Black & Decker heavy duty Drill, mounted in a Black & Decker Bench Drill Stand. This versatile drill set-up is used for drilling steel, brass and bronze fittings on a gigantic boat-building program.*

NICKEL AIDS THE CONSTRUCTION INDUSTRY

to KEEP 'EM WORKING!

Engineers who design construction equipment can take pride in the construction industry's greatest achievement... its part in building America's "Arsenal of Democracy."

For they contributed to that amazing success, even long before the war started. They designed the tools with which the job was done... found ways to make equipment durable, and thus prevented many a breakdown of machinery at this critical time when nothing must interfere with the drive toward Victory.

Familiar to them, as a means of giving longer life to construction equipment, is the widespread use of Nickel Alloys. Those engineers have learned from long experience that Nickel imparts toughness, strength, and corrosion resistance to ferrous and non-ferrous metals, and thus assures improved performance under the most severe conditions.

Among them, as with men in many other industries, the saying is that "a little Nickel goes a long way" toward increasing dependability of machine parts—from gears to scraper blades, from dipper teeth to crusher rolls.

The experience of contractors, engineers, and machine operators in the field supports this conviction of the designing engineers... proves that the products of leading manufacturers stand up longer under the stress of exacting service.

It has been the privilege of INCO engineers and metallurgists to cooperate with the construction industry for many years. To men in all industries who desire assistance in the selection, fabrication, and heat treatment of ferrous and non-ferrous alloys, the International Nickel Company cordially extends an offer of counsel and data.

New Catalog Index

New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects—from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

★ *Nickel* ★

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*

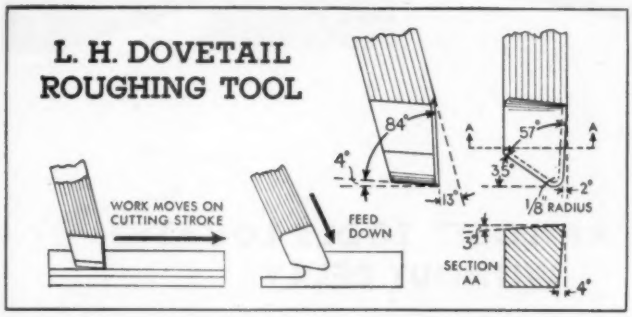
HOW AND WHY

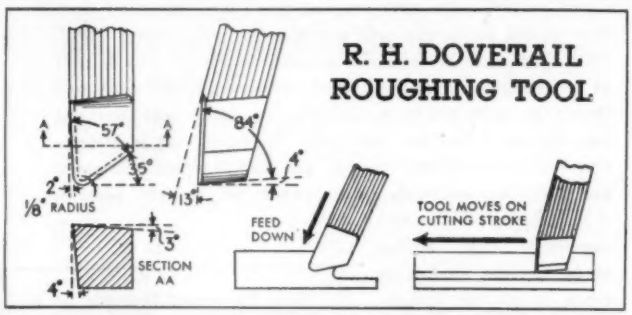
WILLIAMS' TOOLS AID WAR PRODUCTION

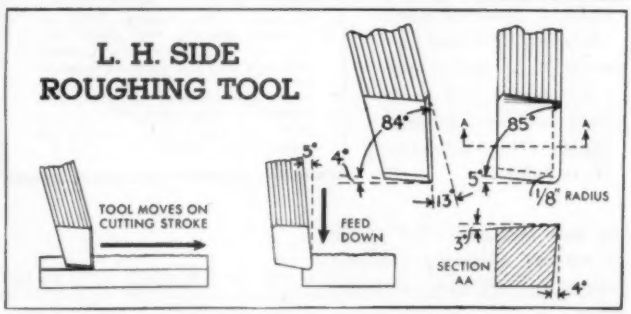
GRINDING CUTTERS FOR WILLIAMS' TOOL HOLDERS

DATA SHEET D, covering the various Shaper tools used in Williams' Holders for machining Cast Iron.

● Williams' Turning-Tool Holders are regularly used for Shaper work. They are made in eight sizes for cutters 3/16" to 3/4" square. Since the cutter channel is broached at a 15° angle, as shown at right, allowance must be made for this fact when grinding cutters. *Grinding* and *applied* angles are given below.

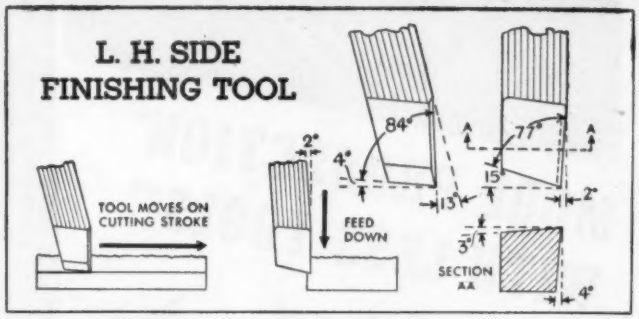


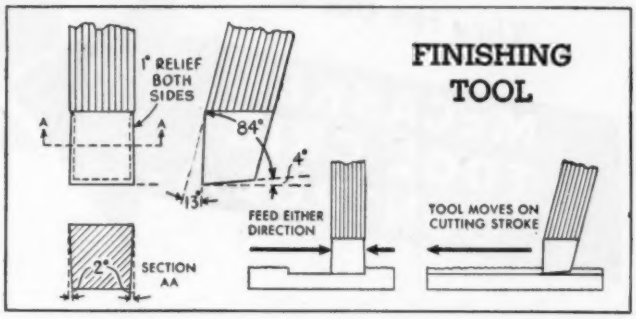


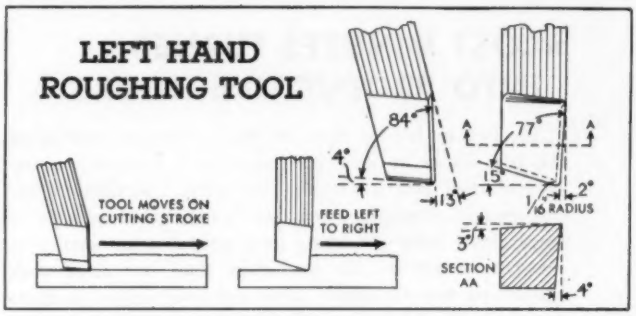


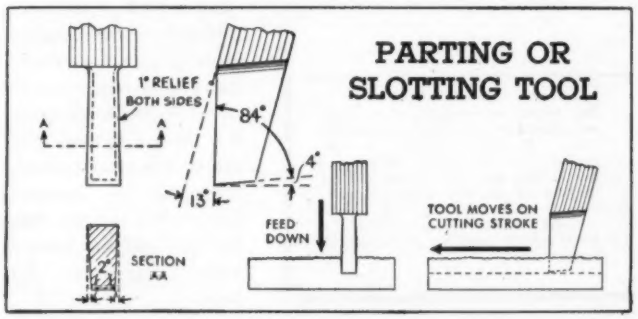
Sold by Leading Industrial Distributors Everywhere

J. H. Williams & Co., Buffalo 7, N. Y.





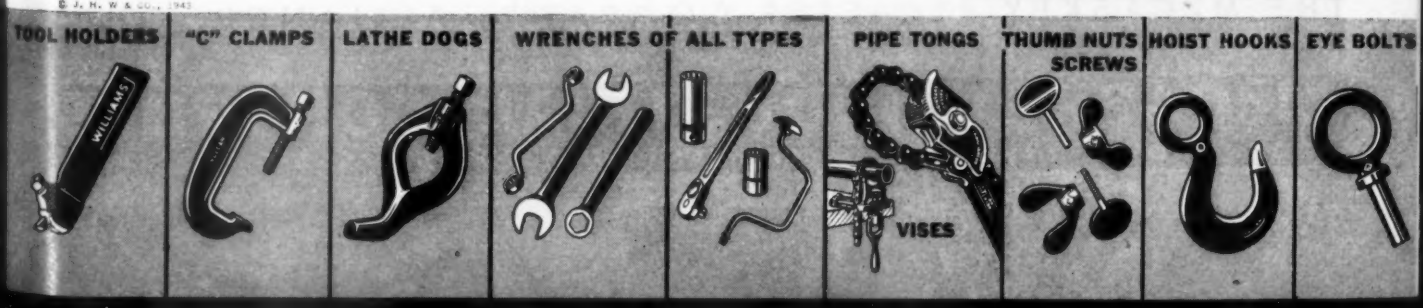




Data Sheets A, B and C on this subject have already appeared. Additional Data Sheets on grinding of other cutters for Williams' Tool Holders will follow. Reprints of Data Sheets are available on request.

WILLIAMS
SUPERIOR DROP-FORGED TOOLS
Headquarters
for over half a century for
DROP-FORGINGS and DROP-FORGED TOOLS

© J. H. W. & CO., 1943



Small Tool Shortage *EXTREMELY CRITICAL*

MORE PRODUCTION* WITH LESS TOOLS**

Thru the Use of

McCASKEY TOOL CRIB CONTROL...

★LOST MINUTES TURNED INTO PRODUCTIVE HOURS

The line of two or three or more employees waiting at the crib window to draw and return tools represents a loss of production that is entirely unnecessary. McCaskey Control enables attendants—even the inexperienced ones in so many plants today—to locate tools without delay whether in the crib or out on the production floor, to record each transaction and to quickly serve everyone without a single dispute concerning responsibility for tools loaned or returned.

Numerous time studies made by users have shown that the average transaction with McCaskey takes only half the time with checks and other systems. (Examples on request.) The result is less idle time for men and machines—more production for both.

The works accountant of a large manufacturer of war products says: "A big reduction in the number of tool crib clerks required and an even larger saving in time of machine operators procuring tools has resulted. The McCaskey Control superseded the brass check method prevalent in former days."

★★"LOST" TOOLS LOCATED WITHOUT DELAY

McCaskey Control prevents employees from hoarding tools that should be in the crib available for use. Many "lost" tools simply are out-of-sight in some employee's tool box or at his machine. McCaskey fixes responsibility for each tool loaned to each employee, showing how many each has and how long each tool has been out. Tools are kept in circulation and inventories are reduced. Loss and theft are eliminated and breakage invariably is cut twenty-five to fifty percent.

Investigate these and numerous other savings made through McCaskey for a surprisingly low investment. Qualified industrial representatives are available to analyze your requirements and offer practical recommendations. No obligation. Write today.

From the Master Mechanic of a leading Rochester, N. Y., manufacturer: "In January, 1938, we replaced our old tool check system with McCaskey Tool Control. The loss of tools stopped immediately and so did all disputes about getting back the same tool loaned to employees. These and other savings have resulted in reduced tool costs."

Let us have a representative explain how McCaskey Tool Control can be installed in the busiest cribs without disturbing production in the least—or send you factual reports on McCaskey savings in time and tools in several well-known plants.

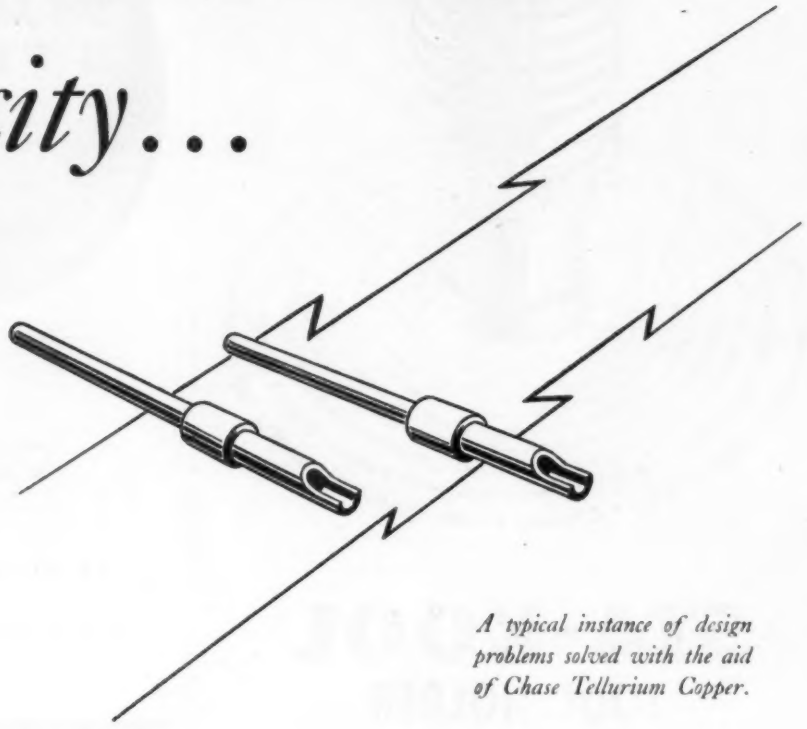
McCaskey Systems Ltd., Galt, Ontario, Canada — *The McCaskey Register Co., Watford, England*

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL

Pathways for air-borne *Electricity...*



A typical instance of design problems solved with the aid of Chase Tellurium Copper.

BOMBER sections meet on the assembly line... and a single motion links complex circuits through multiple electrical connectors. Contact pins are the heart of the connectors... the vital junction points for the pathways of electricity-in-flight.

Simple in design, these contact pins, but a difficult problem in metal selection. Brass is too low in conductivity. Copper, too tough to machine to the close tolerances needed for smooth fit and perfect contact.

The solution? Chase Tellurium Copper.

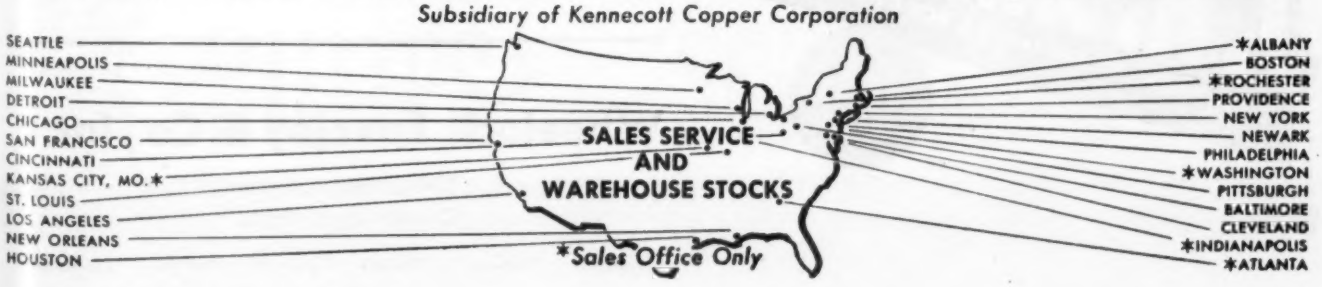
CHASE

This unusual alloy machines almost as easily as free cutting brass, yet its conductivity averages 90% of copper's. Hot forges like copper, too, for the presence of tellurium has no effect on hot working properties.

Isn't there a place in your own products for a metal with this combination of forgeability, machinability, and conductivity? You can get the full facts on Tellurium Copper by calling the nearest Chase Sales Service Office. Keep in touch with the metal specialists there... they'll keep *you* in touch with the latest developments in copper alloys.

CHASE BRASS & COPPER CO. *Incorporated,* **WATERBURY, CONNECTICUT**

Subsidiary of Kennecott Copper Corporation



STA-KOOL
TOOL HOLDER

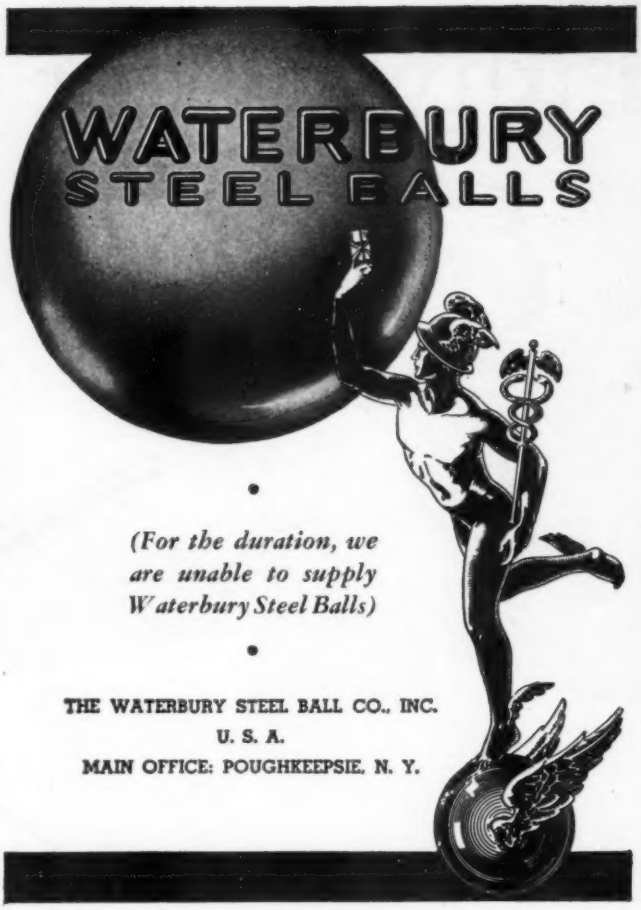
What makes a really fine tool? Proper design and construction, of course, as well as quality of material and workmanship, plus the maker's integrity. JKS Diamond Tools are designed to meet all production problems, but it frequently happens that special conditions call for special treatment. In such cases we make a study of these conditions, preparing a JKS Diamond Tool that will stand up to the most exacting tests. You may add our experience and facilities to your organization by telephoning our nearest district office. This will bring prompt response and wholehearted coöperation.

J. K. SMIT & SONS

157 Chambers St., New York, N. Y. 6400 Tireman Ave., Detroit, Mich.

Ⓚ

WATERBURY STEEL BALLS



(For the duration, we are unable to supply Waterbury Steel Balls)

THE WATERBURY STEEL BALL CO., INC.
U. S. A.
MAIN OFFICE: POUGHKEEPSIE, N. Y.

AISI HY-TEN **SAE**

NE

ALLOY STEELS FOR DEFENSE

Scientifically selected to conserve critical alloys and meet the requirements of the AIRCRAFT, ORDNANCE, and MACHINE TOOL industries.

Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

Wheelock, Lovejoy & Co., Inc.

138 Sidney Street
Cambridge, Mass.

Cleveland Chicago Newark Detroit Buffalo Cincinnati

for Your Screw Driving Army

NO PRACTICE NEEDED TO DRIVE PHILLIPS SCREWS...

It's no problem to replace men who have left your screw driving army for the fighting front, *if you use Phillips Recessed Head Screws.* Anybody can "take over", without training, and do a good job!

The scientifically designed Phillips Recess makes screw driving fool-proof. It automatically centers the driving force and eliminates all driving troubles . . . fumbling, wobbly starts . . . slant-driven screws . . . burred and broken screw heads . . . and dangerous screw driver skids.

Screw and driver "become one unit", making such efficient use of turning power that driving is much easier and faster, regardless of driving method. And, power driving is made practical.

Compare the cost of driving Phillips and slotted head screws. You'll find that it actually costs less to have the advantages of the Phillips Recess!

KEY TO FASTENING SPEED AND ECONOMY

The Phillips Recessed Head was scientifically engineered to afford:

Fast Starting – Driver point automatically centers in the recess . . . fits snugly. Screw and driver "become one unit." Fumbling, wobbly starts are eliminated.

Faster Driving – Spiral and power driving are made practical. Driver won't slip out of recess to injure workers or spoil material. (Average time saving is 50%.)

Easier Driving – Turning power is fully utilized by automatic centering of driver in screw head. Workers maintain speed without tiring.

Better Fastenings – Screws are set-up uniformly tight, without burring or breaking heads. A stronger, neater job results.

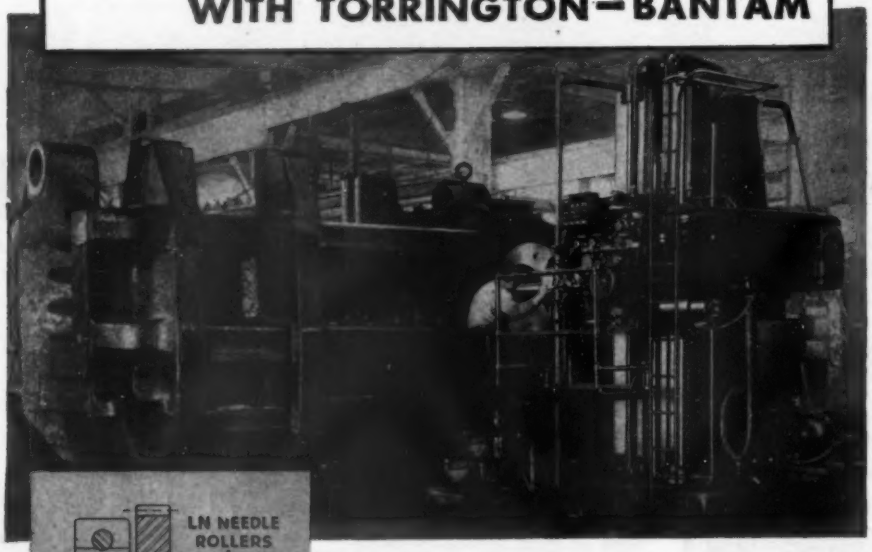
PHILLIPS *Recessed Head* SCREWS

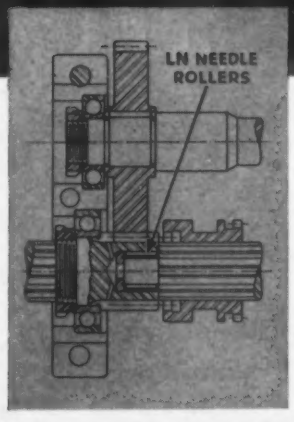
WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

21 SOURCES

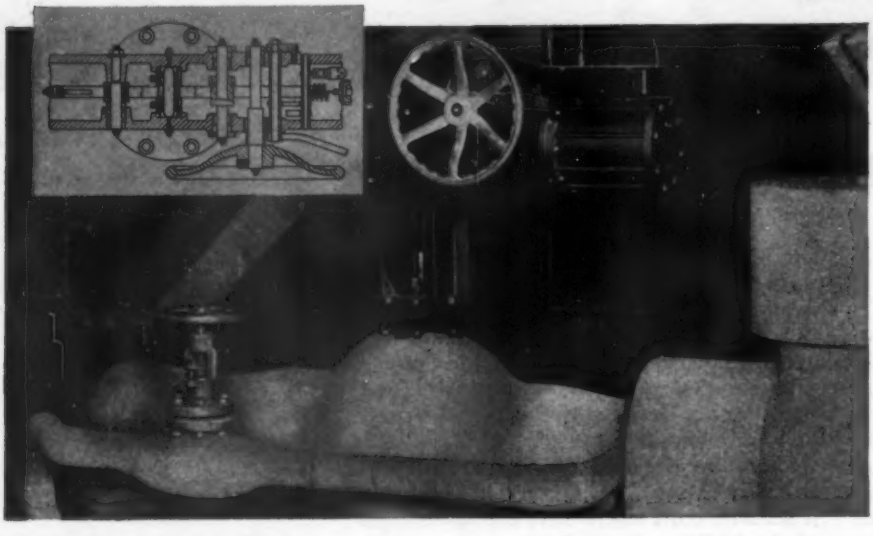
American Screw Co., Providence, R. I.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
The Charles Parker Co., Meriden, Conn.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Phoenix Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Corp., Nashua, N. H.

IN THE NEWS
WITH TORRINGTON—BANTAM

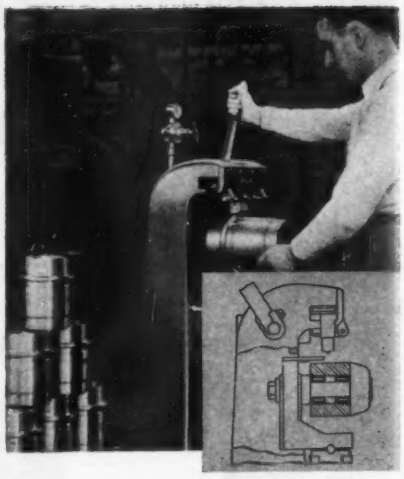




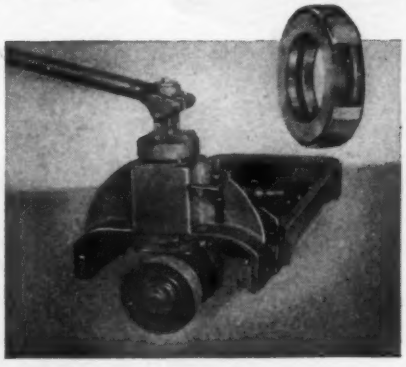
MACHINING GIANT CASTINGS to precision limits is simplified by this 6-inch spindle, floor-type horizontal boring, drilling and milling machine manufactured by The Ohio Machine Tool Company. 44 Type LN Needle Rollers, which are used as the pilot bearing of the transmission, as shown in the accompanying cross-section, contribute materially to the smooth, stable and precise performance of these finely engineered milling machines. Needle Bearings in all types and sizes from one-quarter inch to over seven inches in diameter for virtually all needs are available from Torrington. Our engineers will be glad to help in the selection of the type to meet your requirements.



WATER FLOWING AT HALF-TON PRESSURES through an 8-inch pipe is controlled by this three element feed water control valve made by the Bailey Meter Company. The valve is part of the control system of a modern high pressure boiler which serves a 60,000 kwh turbine in an electric generating plant. As shown in the accompanying cross-section, Type NCS Needle Bearings assure dependability and ease of operation for which this valve is noted. Further information on Needle Bearings is available on request.



MARKING ROUND OR FLAT SURFACES, precision graduating and serial numbering are the accomplishments of this versatile Pneumatic General Purpose Marking Machine built by the Noble and Westbrook Manufacturing Company. The worker shown here is marking part numbers on finished aircraft engine cylinder barrels, while the cross-section shows the mandrel support which holds the work. A compact, high capacity Type NCS Needle Bearing carries the mandrel to provide ease of rotation.



MATERIALS HANDLING with manual equipment is aided by such modern items as this liftruck manufactured by the Revolvator Company. Unusual maneuverability is made possible by the free 360° swing of pump and pulling handle, which is designed for anti-friction operation through use of a Torrington Ball Thrust Bearing in combination with a Type DC Needle Bearing.

IF YOUR NEED IS FOR LARGE BEARINGS, Torrington-Bantam's experience in the design, application and manufacture of outsize bearings is of special value. Or if you have a bearing problem which appears to call for special treatment, the experience of Torrington engineers in the design and application of every major type of anti-friction bearing suggests that you can profitably TURN TO TORRINGTON for expert counsel.

ARMY NAVY

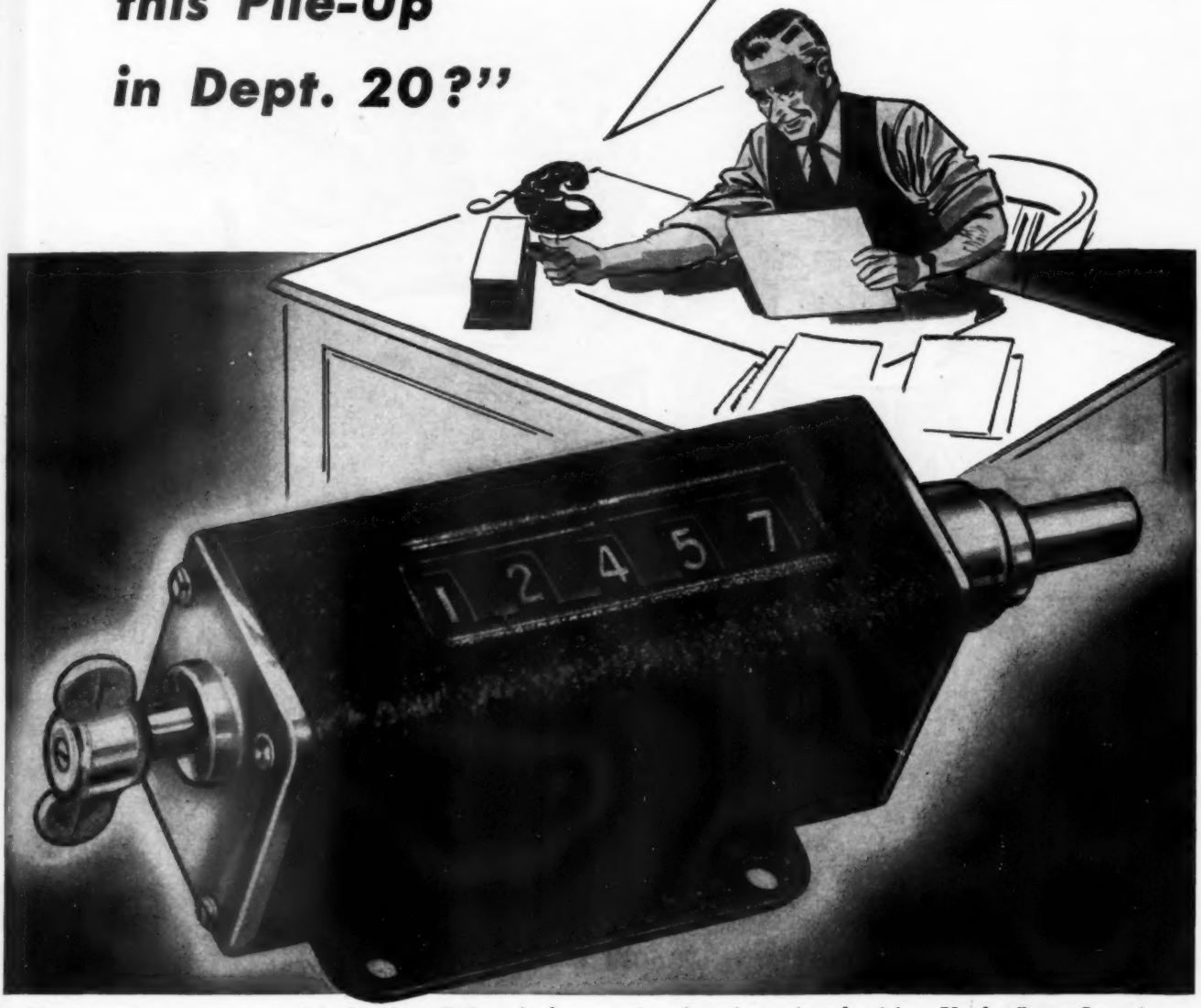
TORRINGTON BEARINGS

STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

THE TORRINGTON COMPANY • BANTAM BEARINGS DIVISION

SOUTH BEND 21, INDIANA

"What's the Score on this Pile-Up in Dept. 20?"



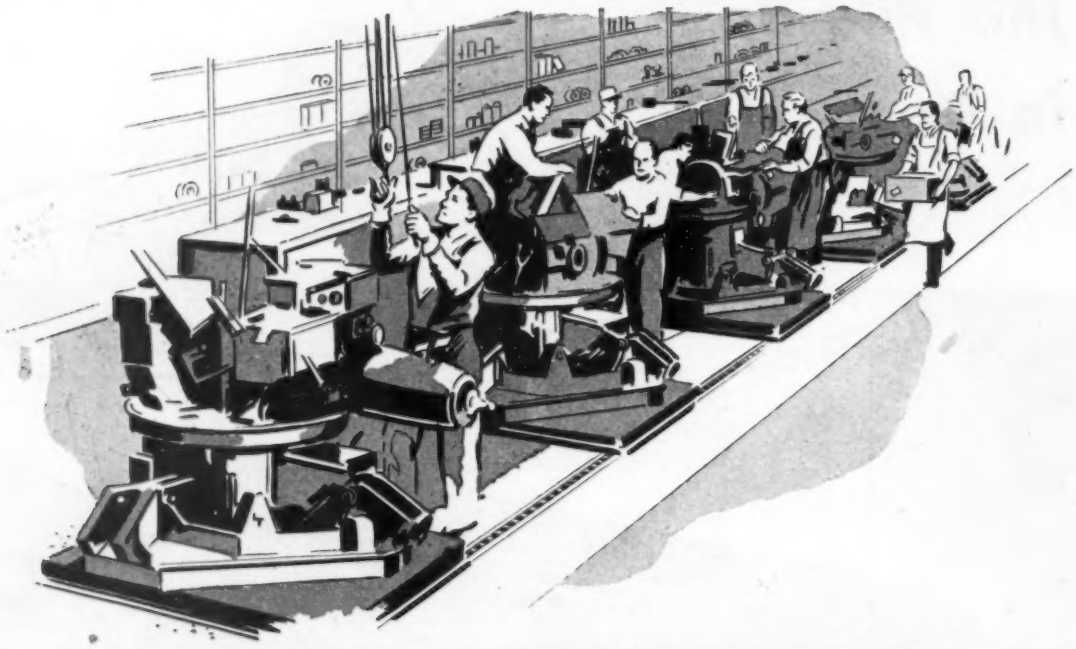
The score is a goose-egg with the rim off. Somebody miscounted in Departments 18 and 19 . . . because there was no means of maintaining an accurate count . . . and so Department 20 wound up the day with a shortage of parts that clogged up final assembly, disrupted today's shipping schedule, and *tomorrow's* production schedule. Nice going, with a war to win —*toward which every minute of the day should be made to count to the utmost.*

And every minute of the working day *can* be made to count to the utmost, if every production machine in the plant is equipped with a Veeder-Root Counting Device that shows, *as of the present moment*, whether the machine is operating up to scheduled capacity, or whether it is in need of adjustment, repair, or regulation of power-flow. So shortages can be prevented, and interdepartmental co-ordination can be held constantly right on the button. See what Veeder-Root *Control-by-Count* can do to smooth out and speed up *your* war-production schedules. Write:

VEEDER-ROOT INCORPORATED
HARTFORD 2, CONN.

You Always Know the Score on Production . . . when it's kept by VEEDER-ROOT Counting Devices

DOES *One Part* THAT'S "A.W.O.L." SLOW UP YOUR PRODUCTION ?



RIGHT now, when peak production is most vital, is your output being curbed by missing parts? Do failures to maintain proper precision and quality standards in difficult parts cause rejections that slow up your assembly lines?

Contact KAYDON

For present or postwar product improvement . . . for more production at lower costs, now and in the future . . . Kaydon precision facilities and experience in producing difficult parts may be the answer to your problems. Here, specially designed metalworking machinery for large or small precision parts . . . modern heat-treating and flame-hardening equipment . . . plus engineering facilities for designing and building special machinery . . . are at your service, to help improve your output and products.

CAPACITY Immediately AVAILABLE for ball and roller BEARINGS Size 6" to 60"

For excellence in production of extremely precise, unusually large ball and roller bearings.

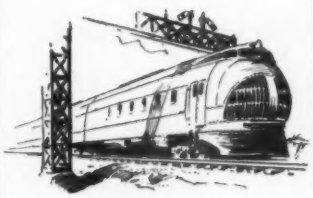
THE KAYDON ENGINEERING CORP.

McCRACKEN STREET • MUSKEGON 81, MICH.

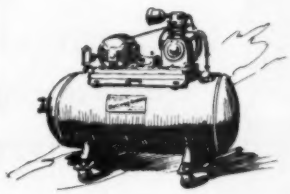
Specialists in Difficult Manufacturing

ARE PARTS A PROBLEM?

Consider BRAKE SHOE *as a Source*



Parts for Trains



Equipment for Garages

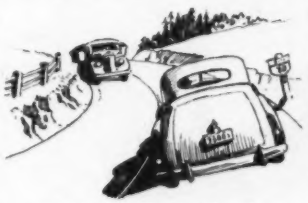
Parts for Excavating

Parts for Oil Drilling

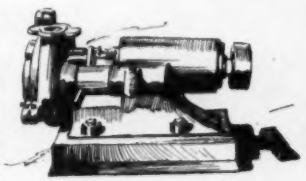
Parts for Planes

Parts in metals, metal alloys and composition.

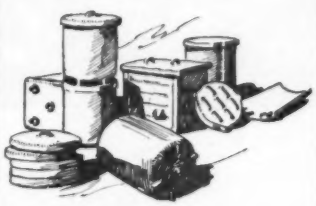
Parts that are cast, upset, drop forged and molded.



Parts for Cars, Trucks

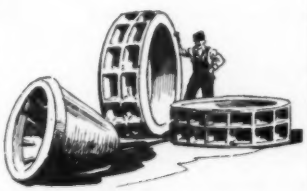


Industrial Pumps



Parts for Heat Treating

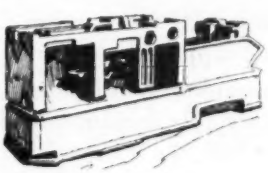
Parts for Ships



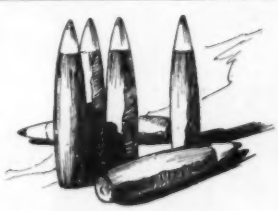
Parts for Crushers

Whether your "punished part" problem requires one casting or thousands of steel forgings, BRAKE SHOE is equipped to serve you.

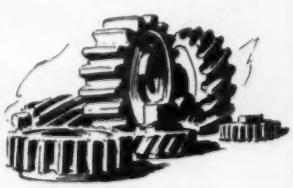
ENLIST your dollars for Victory — Buy more WAR BONDS today.



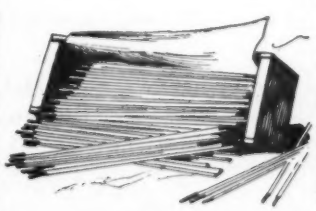
Parts for Machinery



Parts for Shells



Parts for Manufacturers



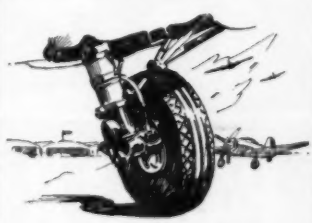
Products for Welding

AMERICAN BRAKE SHOE COMPANY, 230 PARK AVE., NEW YORK 17, N. Y.

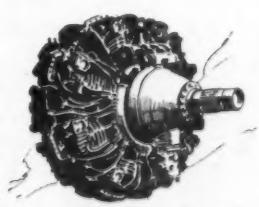
AMERICAN Brake Shoe COMPANY

58 PLANTS SERVING INDUSTRY AND TRANSPORTATION

American Brakeblok Division	Detroit, Mich.
Ramapo Ajax Division	New York, N. Y.
American Manganese Steel Division	Chicago Heights, Ill.
Brake Shoe & Castings Division	New York, N. Y.
Kellogg Division	Rochester, N. Y.
American Forge Division	Chicago, Ill.
Southern Wheel Division	New York, N. Y.
National Bearing Metals Corp.	St. Louis, Mo.



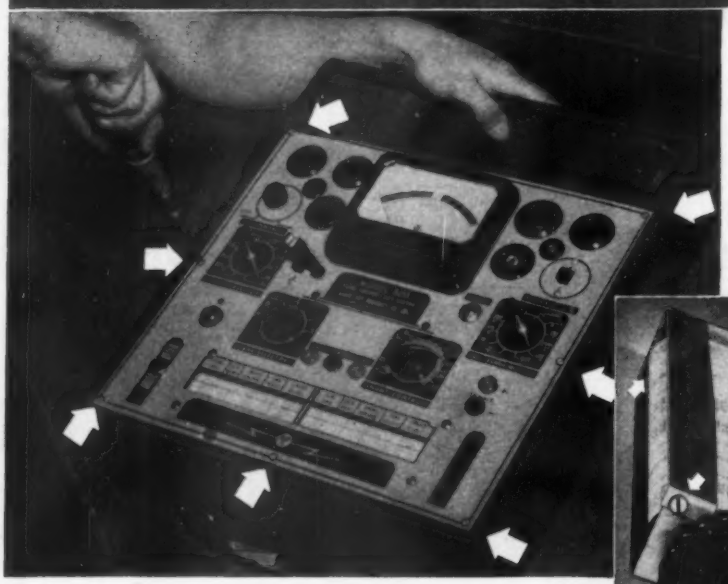
Parts for Landing Gears



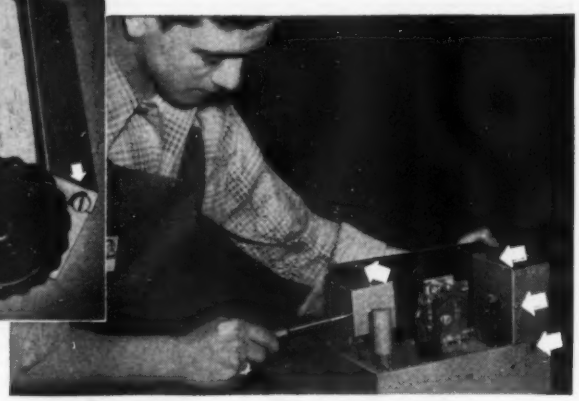
Parts for Aircraft Engines

Parts for Tanks

OUT GOES TAPPING--IN COME *Savings*



Instrument Manufacturer *Questions Every Fastening* and changes to the simple P-K Self-tapping Screw method!



TOP — P-K Type "A" Screws fasten instrument to wood housing . . . provide better holding power than wood screws because they are more mechanically correct and are threaded to the head.

CENTER — P-K Type "Z" Screws fasten index roller to 1/32" steel panel.

RIGHT — P-K Type "Z" Screws fasten steel cover to 1/16" steel shield container, and coil shield to 1/16" steel chassis.

BELOW — P-K Type "A" Screws fasten instrument to 1/32" metal housing.

Multiply the fastenings illustrated here by many hundreds of similar war-needed assemblies made daily in the plant of the Radio City Products Co., New York. You will then have an idea of the many vital work-hours this company saves by adopting P-K Self-tapping Screws wherever possible, and avoiding tapping holes for machine screws.

The simple P-K Self-tapping Screw method of making fastenings not only does away with tapping and tap maintenance. It also ends the slow washer-placing and nut-running that goes with bolts; the difficulties of riveting in hard-to-reach places; the need for inserts in molded plastics. With Self-tapping Screws, only one easy operation is necessary . . . turning the Screws into plain holes. No special tools or skilled help are required.

Whether your assemblies are of thin or heavy sheet metal, of castings or plastics, you'll find, in 7 out of 10 cases, that you can simplify work, and improve products with P-K Self-tapping Screws. *Question every fastening job* on your drafting boards, and on your production lines, now! Ask for a P-K Assembly Engineer to call and help you check your fastening jobs for opportunities to save time, labor, and money. If you prefer, mail assembly details for recommendations. Parker-Kalon Corp., 194-196 Varick St., New York 14, N. Y.

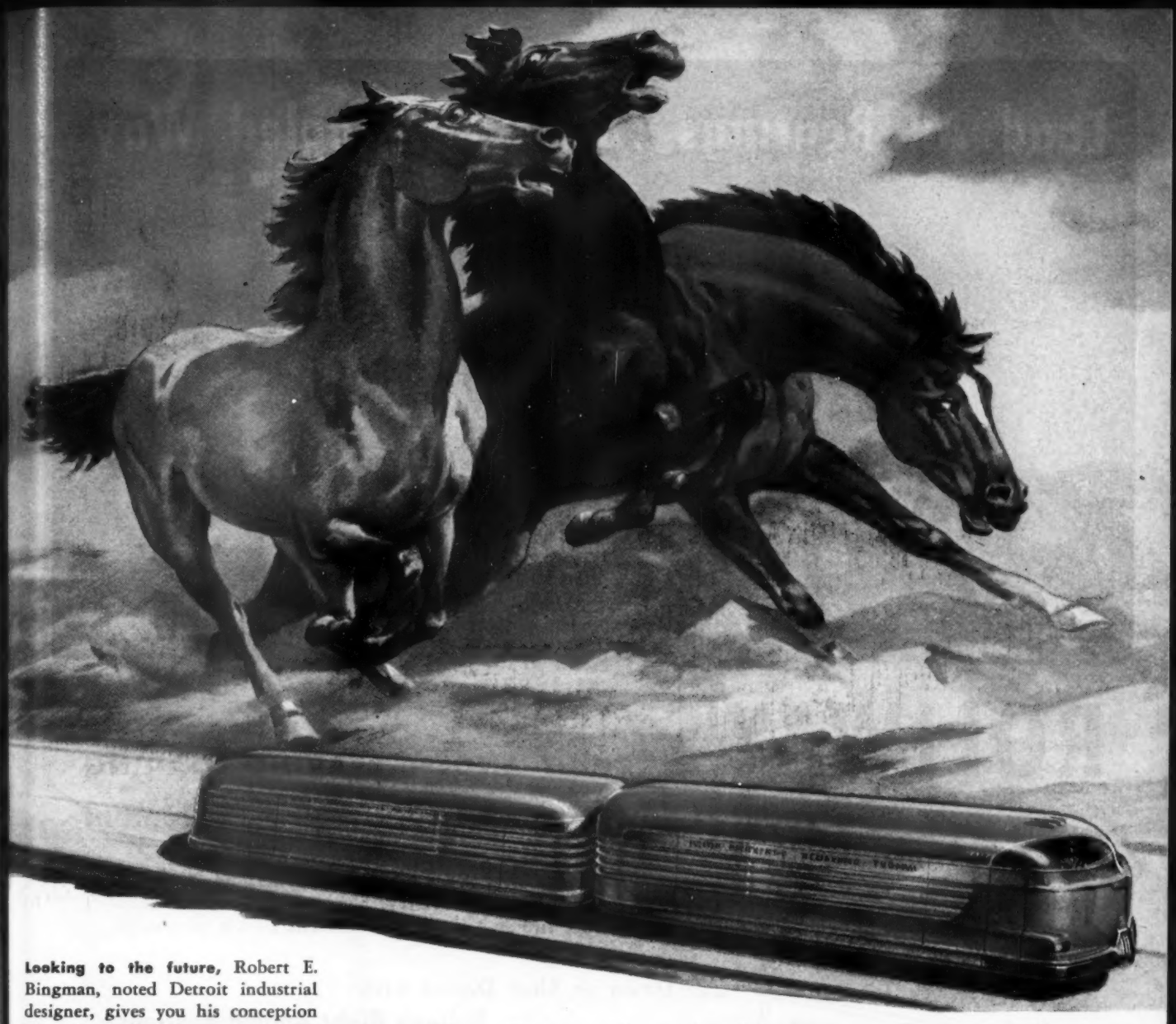
PARKER-KALON

Quality-Controlled

SELF-TAPPING SCREWS

Give the Green Light • to War Assemblies

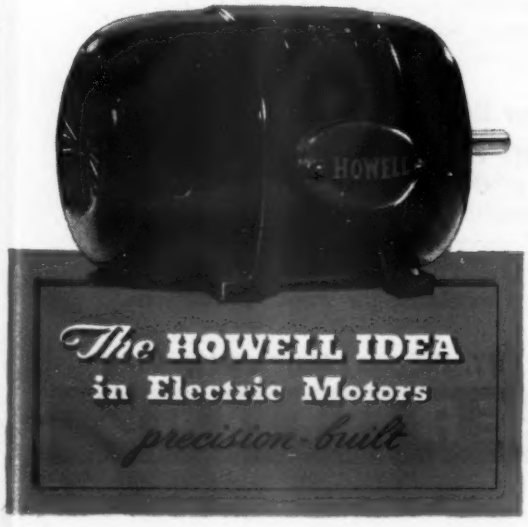
A TYPE FOR EVERY METAL OR PLASTIC ASSEMBLY



Looking to the future, Robert E. Bingman, noted Detroit industrial designer, gives you his conception of a Truck of Tomorrow. You can build these vehicles better, faster, using Howell Electric Motors in your plant — the motors that are built today for the precision standards of tomorrow.

For the plants that build tomorrow's trucks . .

Horsepower by Howell



Be ready for pleasant surprises in motor vehicles . . . After Victory, under our free enterprise system, private industry must take the lead in maintaining prosperity. Many of the new products that will add so much to our way of living will be built in factories with Horsepower by Howell. For Howell Motors are designed and precision-built to meet the exacting standards of manufacturers who want maximum production at minimum cost.

When making your postwar plans, specify Horsepower by Howell for your plant, process or products. Your inquiry will put our experienced engineering staff and complete facilities to work for you.

HOWELL ELECTRIC MOTORS COMPANY

HOWELL, MICHIGAN

Manufacturers of Quality Motors Since 1915

Load All Bearings This Right-Angled Way

. . . and help check the decline in output-per-man-hour

ROLLWAY'S RIGHT-ANGLED BEARING LOADING

reduces down-time for service & replacement

Deterioration of equipment . . . loss of manpower . . . and cumulative labor fatigue . . . ALL are steadily reducing output per worker in war and civilian industry. Every help that can keep shifts operating at top efficiency . . . and machines running without shutdowns . . . is of utmost importance now.

- All radial loads carried at right angles to the roller axis.
- All thrust loads carried at right angles to the roller axis.

Cut Down on Shut Downs with Rollway Right-Angled Bearings

Rollway Roller Bearings wear longer . . . require less maintenance . . . and provide greater carrying capacity in given dimensions, because they *simplify* the load, *reduce* the pressures per bearing and per roller. Rollway splits every load into its two simplest components of *pure radial* and *pure thrust*. Each component is carried at *right angles* to the roller axis by *separate* bearing assemblies. No oblique loads and resultants, no thermal float or uncalculated thrust can impose secondary pressures on *any* Rollway Bearing.

Choose Your Bearings with Care

The torque and life of roller bearings are greatly affected by selection of the proper size and type. Send drawing or detailed description for free bearing analysis and recommendation. No obligation. S.A.E. or American Standard metric dimensions and tolerances available for most applications.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, NEW YORK

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

Use COLMONOY

HARD FACING ALLOYS AND OVERLAY METALS

Your production schedules would be mighty easy if your equipment never wore out.

When machinery wears to the point that it is useless for its particular function, you will find that the wear is localized—one place wears out before the rest.

Coat these critical places with the proper grade of COLMONOY. The application is easy to make, by standard welding methods. You will find that parts so treated will give service many times as long as will uncoated parts. Worn and discarded equipment, when hard-faced with COLMONOY not only go back to work, but they will outwear and outperform new, uncoated equipment.

Our new Catalog No. 75 gives full information on all grades of COLMONOY and shows pictures of many types of application in different industries. Write for your copy today.

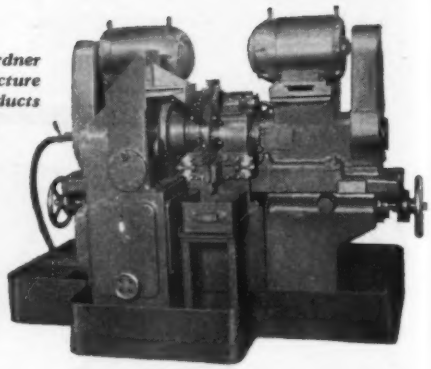
WALL-COLMONOY CORPORATION

Offices in Detroit, New York City, Blasdell, N. Y., Chicago, Tulsa, Los Angeles, San Francisco and in Canada.

CATALOG NO. 75
mailed on request

WALL-COLMONOY CORPORATION

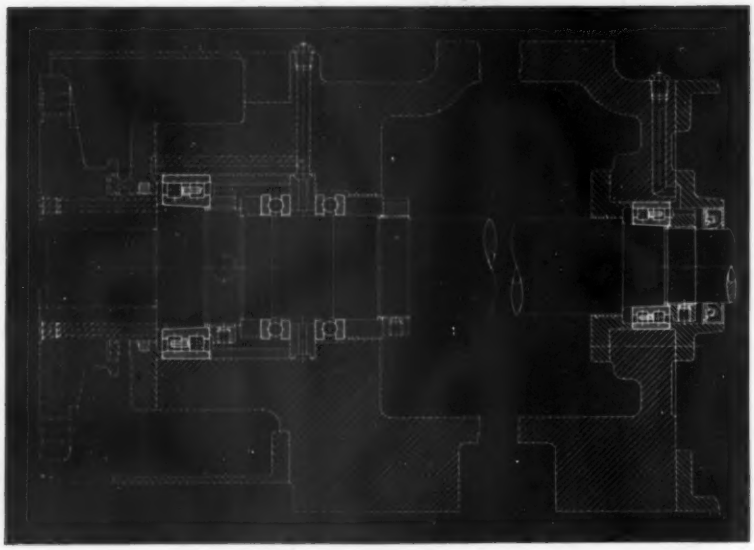
720 Fisher Building · Detroit 2, Michigan



● *No. 115—15" Precision Grinder built by Gardner Machine Co., widely used in the manufacture of ball and roller bearings and other products in which close tolerances are a "must".*

On Grinders

BACK OF THE ATTACK

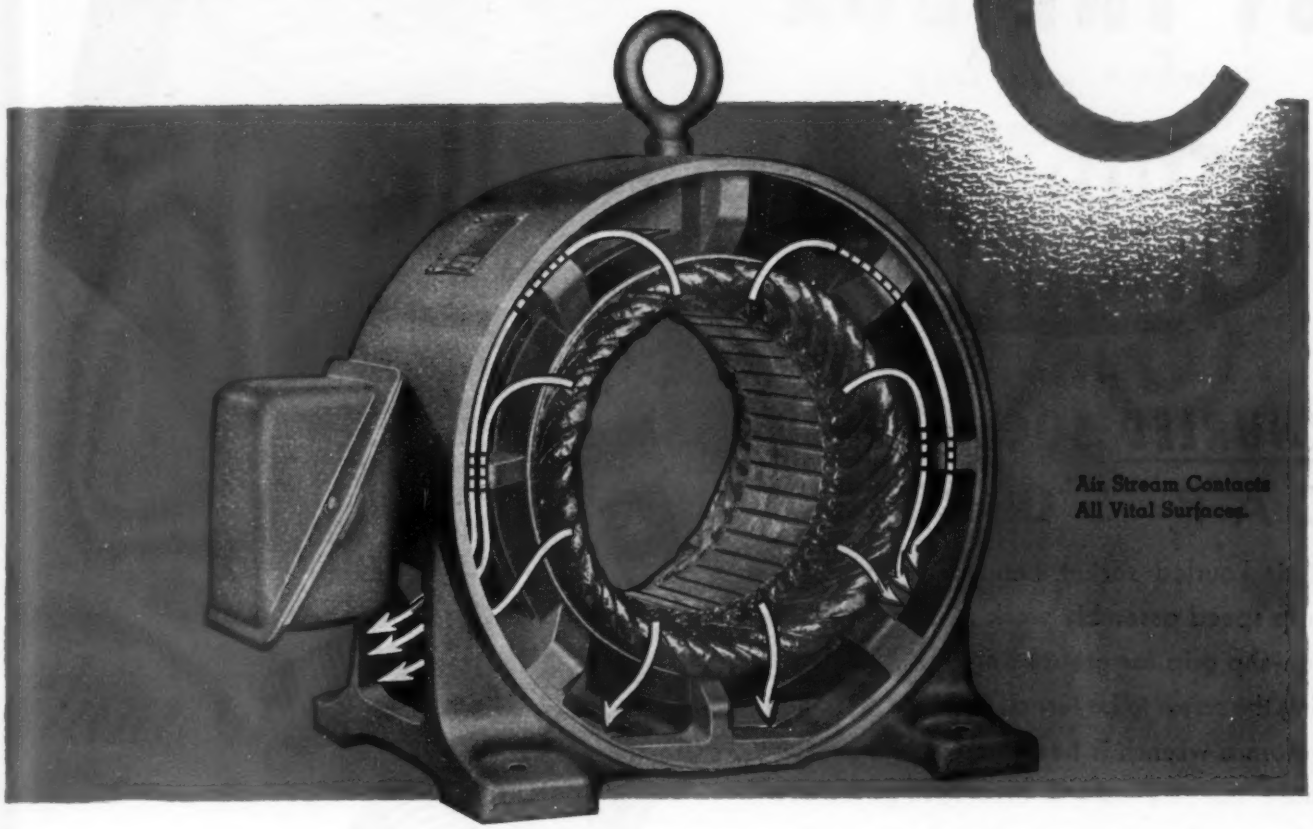


High output and extreme accuracy are essential for grinders that help make the weapons for the attack on Axis lands. To make certain of these factors, Gardner engineers use SKF Cylindrical Roller Bearings for radial support and SKF Thrust Bearings for thrust support. With this combination, there's *maximum rigidity* axially and radially. There's also *extreme smoothness* from a large number of staggered ultra-precision rollers which are finished by a special method. There's *constant low temperature* due to low friction. As a result, there's accuracy . . . smooth finish . . . high production. When a grinder is SKF-equipped, it backs the attack to the limit.

5364

SKF Industries, Inc., Phila., Pa.

CENTURY FORM J
Ventilation System Keeps the Motor Clean!



The Century method of motor ventilation not only protects the insulation by sending a blast of cooling air through spacious air passages to all vital motor parts, but also keeps the air passages clean. This is due to Century's ventilation design in which the *cooling air is:*

1. Drawn in around the bearing housing by two fans and the rotor bars.
2. Directed against the end of the rotor near the shaft.
3. Blown out across the copper conductor bar ends by the fans on the rotor.
4. Blown around the stator coil ends.
5. Deflected inside the frame across the outside of the stator laminations.
6. Forced out from the lower half of the frame at the side and bottom of the motor.

Century air passages are large and smooth —not easily clogged—and suspended matter is carried through the passages and blown out by the force of the cooling air blast.

Proper cooling and ventilating is only one of the many design and engineering advantages of Century Motors. For complete information as to the proper Century Motor to meet your requirements, call in your nearest Century Application and Service Engineer today.

Form J Motors Are Now Available in 2 to 15 hp

CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis, Missouri
Offices and Stock Points in Principal Cities.
310

Century MOTORS

1/6 to 600 horsepower.

One of the Largest EXCLUSIVE Motor and Generator Manufacturers in the World.

YOU BUY *Saved Time*

BY THE BOX

when you buy

UNBRAKO

Reg. U. S. Pat. Off.

KNURLED SOCKET HEAD CAP SCREWS

Their knurled socket heads just naturally help speed assembly work . . . providing a non-slip grip for greasy fingers . . . permitting the screw to be turned faster and farther before a wrench is needed. Yet you pay no more for this added time-saving feature when you buy the Knurled "Unbrako." Why not order some "*saved time*" today?

Pat'd and Pat's Pending

SELF-UNBRAKO LOCKING HOLLOW SET SCREW

Another time-saver . . . helps prevent machine breakdowns caused by the ordinary set screw working loose. When tightened as usual, knurled point digs in . . . holds tight against vibration, yet can be used over and over. Sizes: No. 4 to 1½" diam. . . . Write for "Unbrako" Screw Catalog.

KNURLING OF SOCKET SCREWS ORIGINATED WITH "UNBRAKO" YEARS AGO.

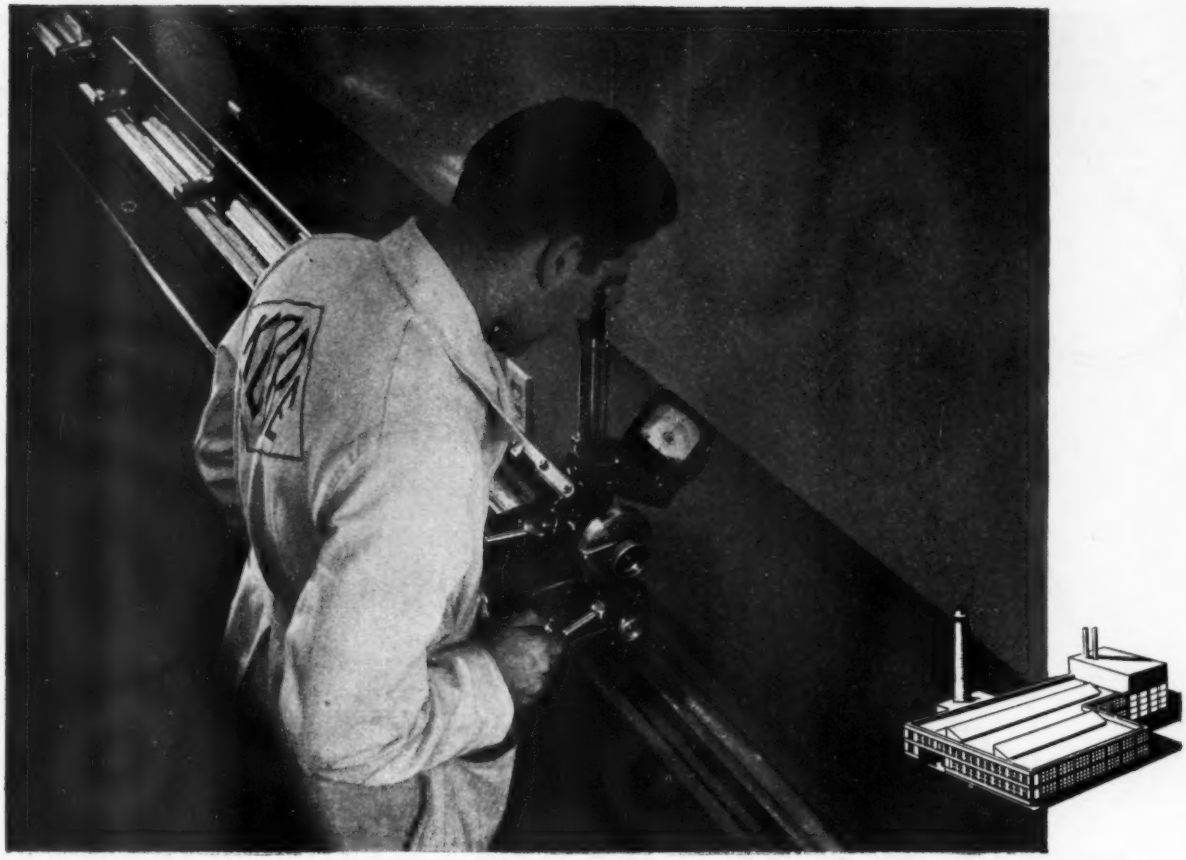
OVER 40 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 57

BRANCHES

BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO



Planning Ahead for a Proven Demand

Producers of gages don't develop manufacturing facilities over night. First, trained personnel must be assembled, top mechanics in their lines; second, special machine tools are required; third, manufacturing methods and processes must be right. Essential as are these three factors, most important of all is probably that priceless ingredient—experience. For years Kobe has made precision equipment and in 1939, 1940 and 1941 started expanding their previously private gage plant. Then as American industry swung into their new, gigantic task of producing for war, Kobe's picture changed. Trained personnel increased, more and more machinery and testing equipment found its way into the Kobe plant, and the plant itself expanded in size, in volume and in character of work handled. The recentness of this expansion has resulted in an uniquely balanced plan for comprehensive precision gage manufacture.

After Victory we hope to tell you of the part Kobe master and reference gages are playing in the war. It will make profitable reading for post-war industry. The reason is simple. The modern and expanded facilities of Kobe's gage plant, developed to the fullest during wartime, will be available for the manufacture of gages to check accuracy and precision in every peace-time industry.

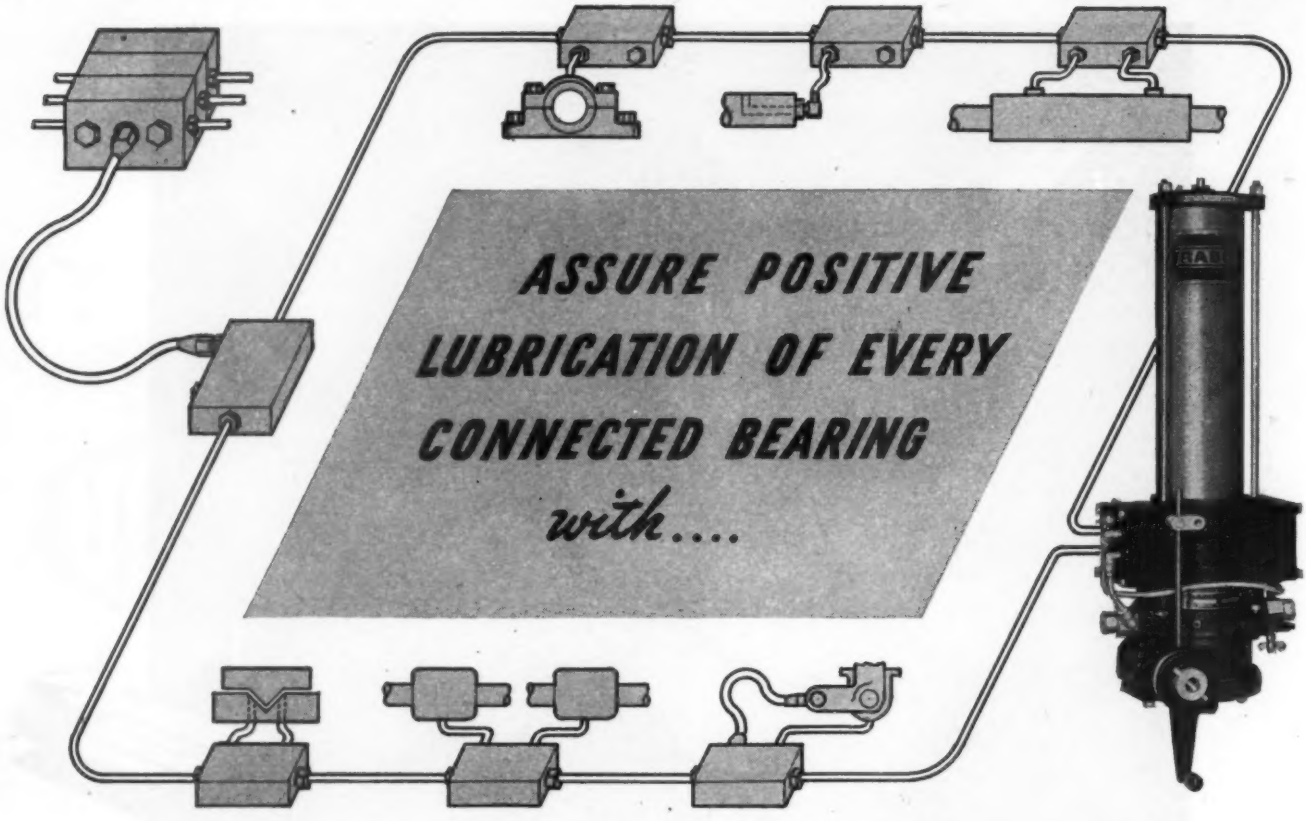
The largest proportion of present day production is going for war needs, but the facilities of this modern plant will be available for peacetime industrialists. Even today, working with new materials, Kobe has devoted considerable thought to adaptation to peacetime needs. Testing, improving, re-testing and perfecting—production efforts all aimed at what industries will require after the war.

KOBE

Master and Reference GAGES

KOBE, INCORPORATED

3040 East Slauson Avenue • Huntington Park, California



TRABON LUBRICATING SYSTEMS

and the Many Design and Operating Advantages only Trabon can give you!

● For years,—on overhead traveling cranes, costly steel mill equipment, forging presses, crushers, and other machinery of every description, Trabon lubrication has been proving its dependability. Trabon avoids costly downtime while a man crawls around the machine lubricating each bearing individually,— the breakdown if he misses one —the lost time and costs of accidents,— makes absolutely certain that every bearing receives just the desired amount of lubricant *while the machine is in operation.*

The use of a single line of piping, thereby minimizing installation time and cost—*fully enclosed* feeders having no outside moving parts to corrode or get bent, and designed internally so as to *positively prevent lubricant from passing any bearing by,* are only a few of the many outstanding features *only Trabon can give you.*

Completely descriptive bulletins containing engineering data of interest to every works manager, designer, operating and maintenance superintendent, describing the Trabon Reversing System, illustrated above, used when bearings are widely spaced,— the Trabon Type "M" systems for bearings that are closely clustered,— and Trabon Unit Lubricating systems for machine tools, etc., furnished gladly. No obligation. Write for the Trabon Data Bulletins today!

TRABON
ENGINEERING CORPORATION

1819 *East* 40*th Street* • *Cleveland, Ohio*

INDUSTRIAL LUBRICATION EXCLUSIVELY SINCE 1922

The One Constant Ingredient

Every V-Belt made by Dayton Rubber contains one ingredient which never varies. Wartime restrictions can never affect it. It is mixed into every compound of natural or synthetic rubber. It is woven into every inch of fabric, cord or wire destined for Dayton V-Belts.

This constant ingredient is the sum total of Dayton Rubber's 37 years of continuous development, processing and application of rubbers and fabrics of every type. It is the residue of thousands of man-hours of patient research, practical testing and controlled manufacturing ability. This constant ingredient is the technical knowledge and experience that you would naturally expect to find built into every V-Belt by Dayton, the world's largest maker.

So whether the V-Belts you use are made of today's synthetics or tomorrow's "X" materials need not concern you — so long as they bear the name which stands for Technical Excellence over the years.

THE DAYTON RUBBER MFG. CO.
DAYTON 1, OHIO

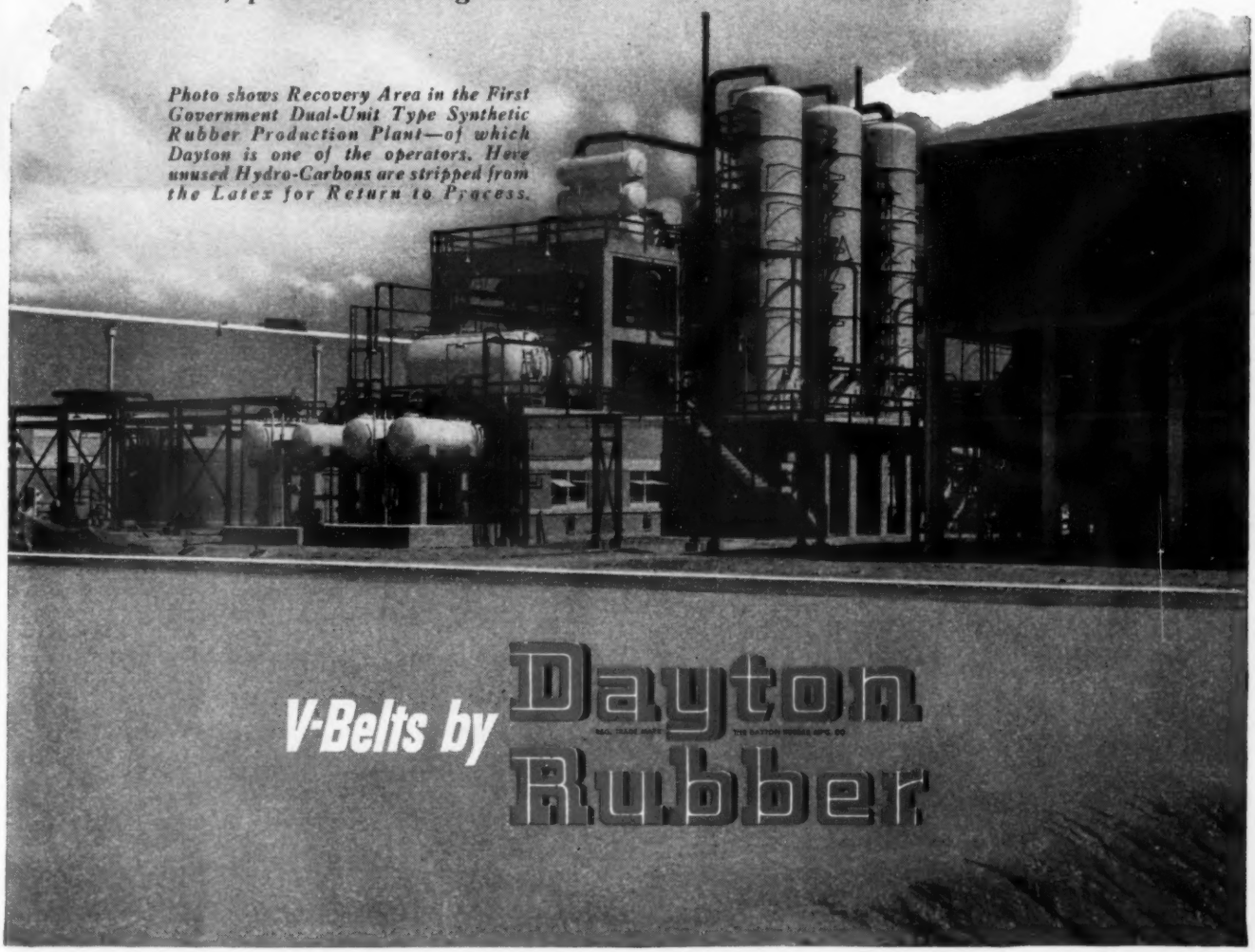
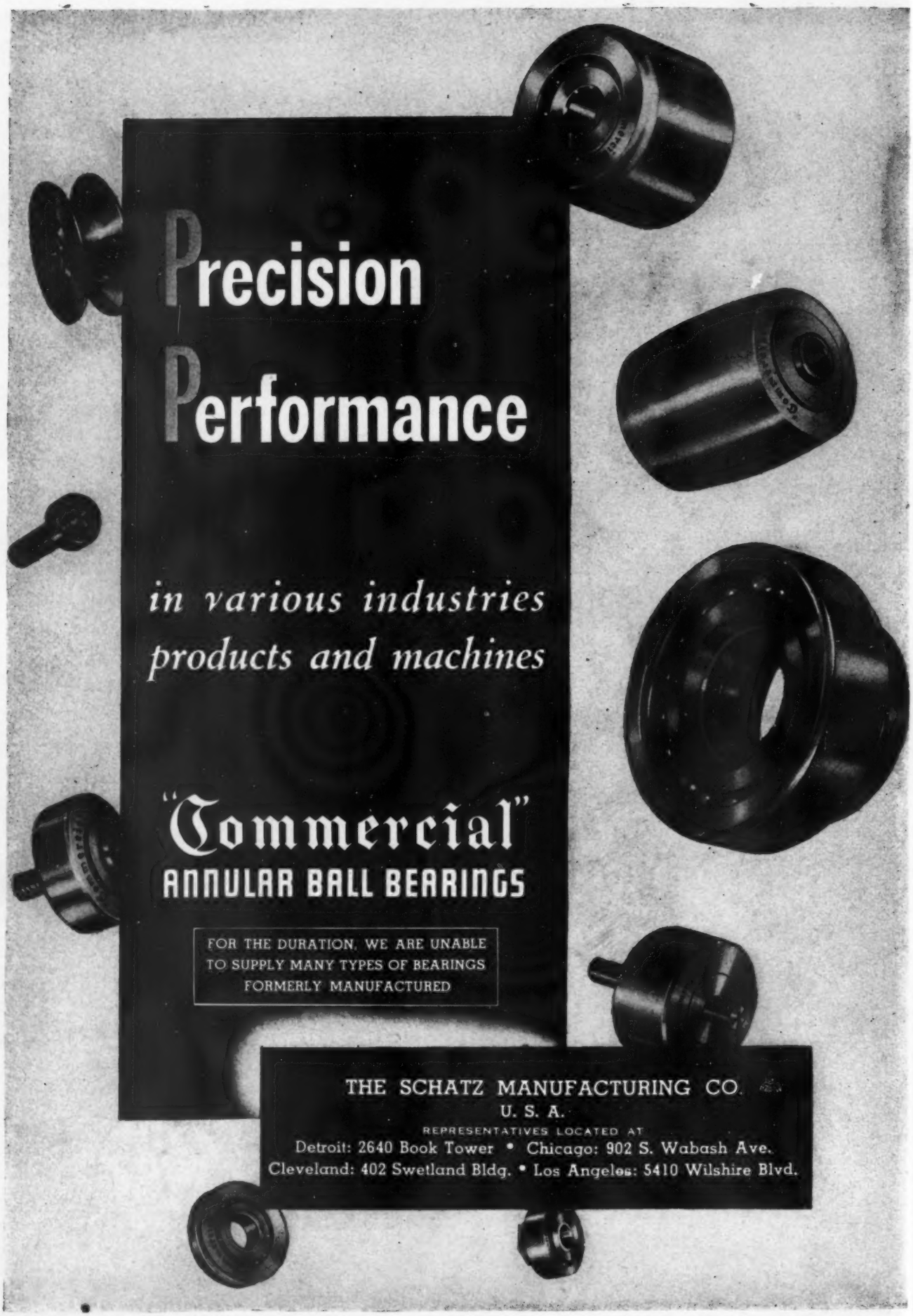


Photo shows Recovery Area in the First Government Dual-Unit Type Synthetic Rubber Production Plant—of which Dayton is one of the operators. Here unused Hydro-Carbons are stripped from the Latex for Return to Process.

V-Belts by Dayton Rubber


Precision
Performance
in various industries
products and machines
"Commercial"
ANNULAR BALL BEARINGS
FOR THE DURATION, WE ARE UNABLE
TO SUPPLY MANY TYPES OF BEARINGS
FORMERLY MANUFACTURED
THE SCHATZ MANUFACTURING CO.
U. S. A.
REPRESENTATIVES LOCATED AT
Detroit: 2640 Book Tower • Chicago: 902 S. Wabash Ave.
Cleveland: 402 Swetland Bldg. • Los Angeles: 5410 Wilshire Blvd.

HERE'S THE KIND OF OVERLOAD PROTECTION YOU NEED FOR PRODUCTION MACHINE MOTORS

The Monitor

THERMALOAD V
SOLENOID STARTER
with COMPENSATED overload relay

Surrounding Temperature does not affect its Performance

The Monitor Thermaload V Solenoid Starter will provide the highest degree of overload protection for your valuable, almost irreplaceable motors. For, into its design have gone features bred of 55 years of experience in designing motor controls for industrial applications . . . features that help maintain high production rates . . . guard against intentional overload by thoughtless operators . . . protect your investment in equipment.

Specify the Monitor Thermaload V for original equipment or replacement. Available for 1.5 to 7.5 H.P., 110-550 Volts A.C. Motors. See the Monitor field engineer in your territory.

The Monitor Thermaload V Solenoid Starter can be shipped promptly from stock. Please comply with existing priority regulations when ordering.

These Monitor Features Back Up the Promise of Greater Protection.

1—Exclusive Monitor Compensated Overload Relay Tests
at + 134.6°F and at —2°F show only a few seconds difference in tripping time. Full overload protection is assured regardless of surrounding temperature . . . hot, cold or fluctuating. The trip always will occur within the same time at a given percent of overload.

2—Vertical, Solenoid Principle
Introduced by Monitor in 1889—proved sound by over half a century of experience.

3—Double-Break Silver Contacts
Designed so that replacement can be made quickly and easily.

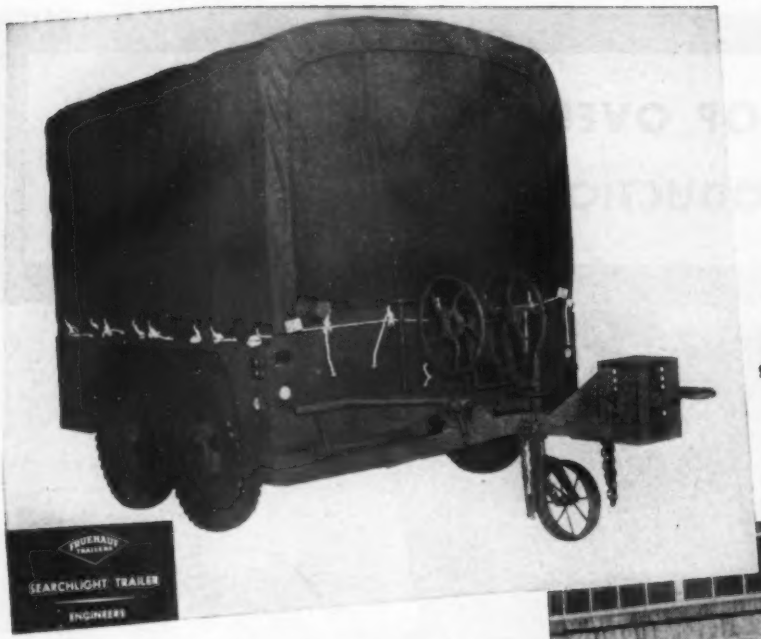
4—Easily-Interchangeable Coils
Change can be made for different voltages without disconnecting external wiring or removing starter from enclosure.

5—Tamper-Proof Protection
The reset button cannot be "blocked in" by operator.

6—Resilient, Shock-proof Mounting
Magnet frame and base are separated by a resilient material.

The Monitor Controller Company
GAY, LOMBARD & FREDERICK STS. BALTIMORE-2, MARYLAND

RBC
NEEDLE BEARINGS
help level the roads for



The RBC CYCLOPS Needle Bearing with inner race is termed the Fulcrum Pin Bearing, a part of the chassis support mechanism of these Army Fruehauf Trailers. We quote from the operator's manual, "The underconstruction is of rocker arm type mounted parallel to the main frame. The wheel spindles are pressed and welded to the rocker arms. The rocker arms are mounted on roller type bearings. The bearings are mounted on a spring hanger assembly which slides in vertical movement."

Where the factors of heavy radial load, shock and vibration are present as they are in this application, you'll find no better bearings for the job than the RBC CYCLOPS.

ROLLER BEARING CO. of AMERICA
TRENTON . . . . NEW JERSEY

WARTIME LESSONS in Aluminum Castings

According to WPB figures, the average American-built war plane contains seven and one-half tons of aluminum; some of the larger bombers carry more than double that weight of aluminum parts. Aluminum castings are an important part of this tonnage. It has been our privilege to produce a part of this tremendous volume of aluminum castings for planes and other armaments. Some of these castings go far beyond pre-war limitations in size — others are of extremely intricate shape and coring. Plane and engine builders have learned that there is no aluminum casting job too large, too small or too complex for Howard Foundry. Deliveries are made on schedule—or sooner.

Current accomplishments in aluminum castings indicate more extensive peace-time applications. In aircraft this is definitely assured. To mention another field—trucks and buses—weight savings of great value will be secured by the broader use of aluminum cast parts in the designs of tomorrow and we hope to figure prominently in these revolutionary improvements, which will embrace a wide range of products.

The three Howard foundries—aluminum, magnesium, bronze—embody the largest jobbing production of nonferrous castings in America; all of which is now being poured for the war effort.

When you need nonferrous castings, check with Howard first.

For armament today—for utility tomorrow.

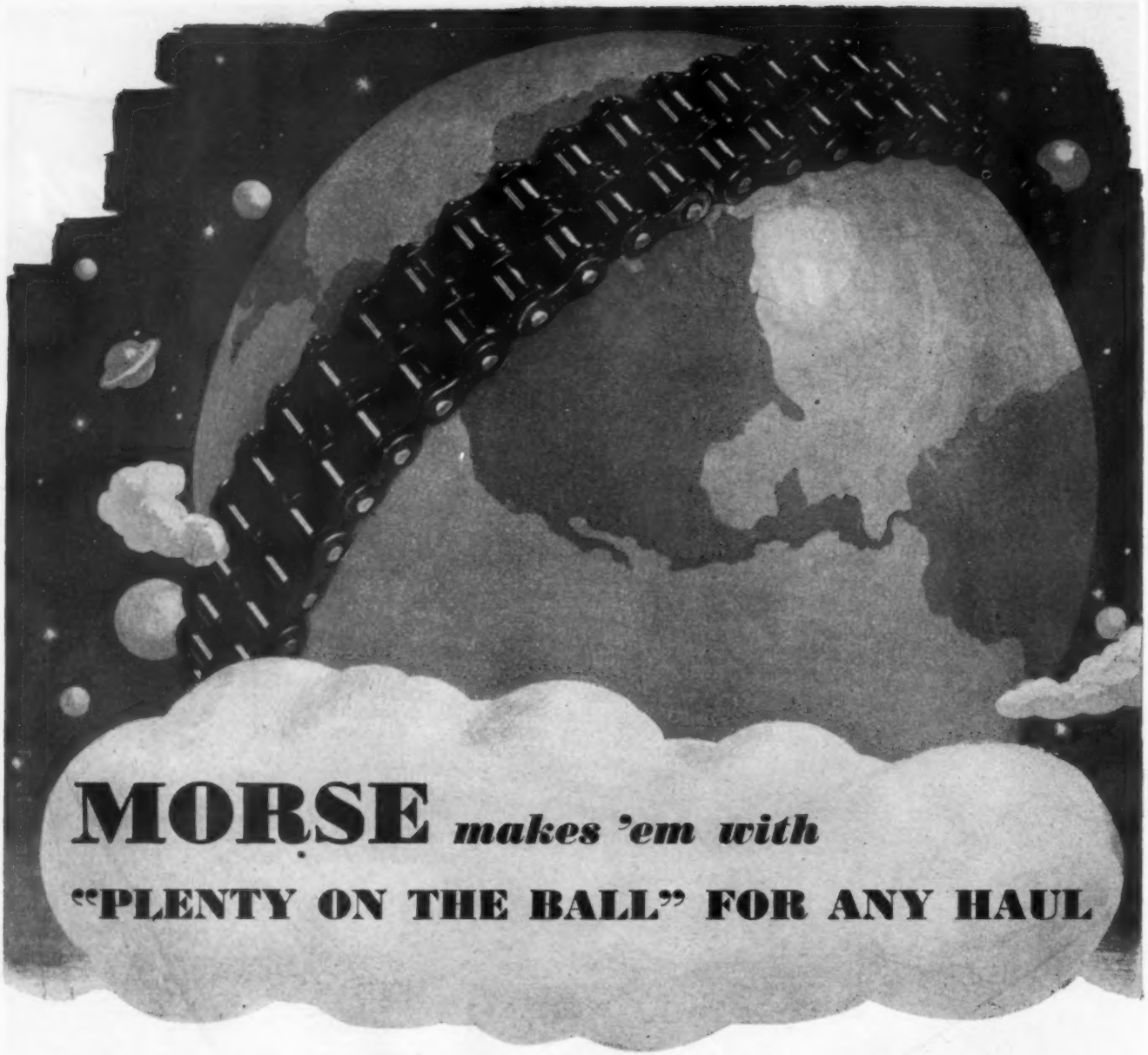
HOWARD FOUNDRY COMPANY
4900 Bloomingdale Rd., Chicago

Now Make THOUSANDS More USA

HOWARD

ALUMINUM · BRASS · BRONZE · MAGNESIUM

CASTINGS



MORSE *makes 'em with*

"PLENTY ON THE BALL" FOR ANY HAUL

MORSE, with more than forty years' experience in the field of power transmission, is an important source of standard and special Roller Chain and Roller Chain attachments.

Today, the phrase "Plenty On The Ball" applies to Morse Roller Chain in more ways than one . . . because today, all around the world, Morse Roller Chain is at work in the automotive and ordnance equipment of our fighting forces. Further, Morse Roller Chain is proving that it has "plenty on the ball" for any haul, for any power transmission job.

If you are a user of roller chain, if you have a design problem concerned with power transmission . . . chances are it will pay you to talk with a Morse man. Naturally, there will be no cost or obligation on your part.

SILENT CHAINS ROLLER CHAINS FLEXIBLE COUPLINGS CLUTCHES

MORSE CHAINS

B-W A division of BORG-WARNER

MORSE CHAIN COMPANY ITHACA, N. Y. DETROIT, MICH.

A-B Precision Type Limit Switches are available in a wide variety of enclosures and operating levers. A few are illustrated below. See Bulletin 801-802 for complete line.

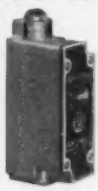
Bakelite Enclosures

For 1001 applications

Roller lever operated

For panel mounting

Cast Iron



Water and dust-tight

With front roller arm

With side roller arm

For cavity mounting

Sheet Metal

For general installations

PRECISION LIMIT SWITCHES

for Machine Tool Applications

This is the Allen-Bradley Bulletin 802 Precision Limit Switch! It is a tiny switch of husky design with big possibilities. In real life it measures only 1-15/16 inches long, 15/16 inch wide, and 27/32 inch deep.

It requires a motion of only a few thousandths of an inch to snap it open or closed . . . and it is good for millions of switching operations without affecting its accuracy. Such a precision control has limitless possibilities. New applications are developing every day. And the A-B line provides a model for every use. Send for Bulletin 801-802. It's a handbook on limit switches for automatic machines.

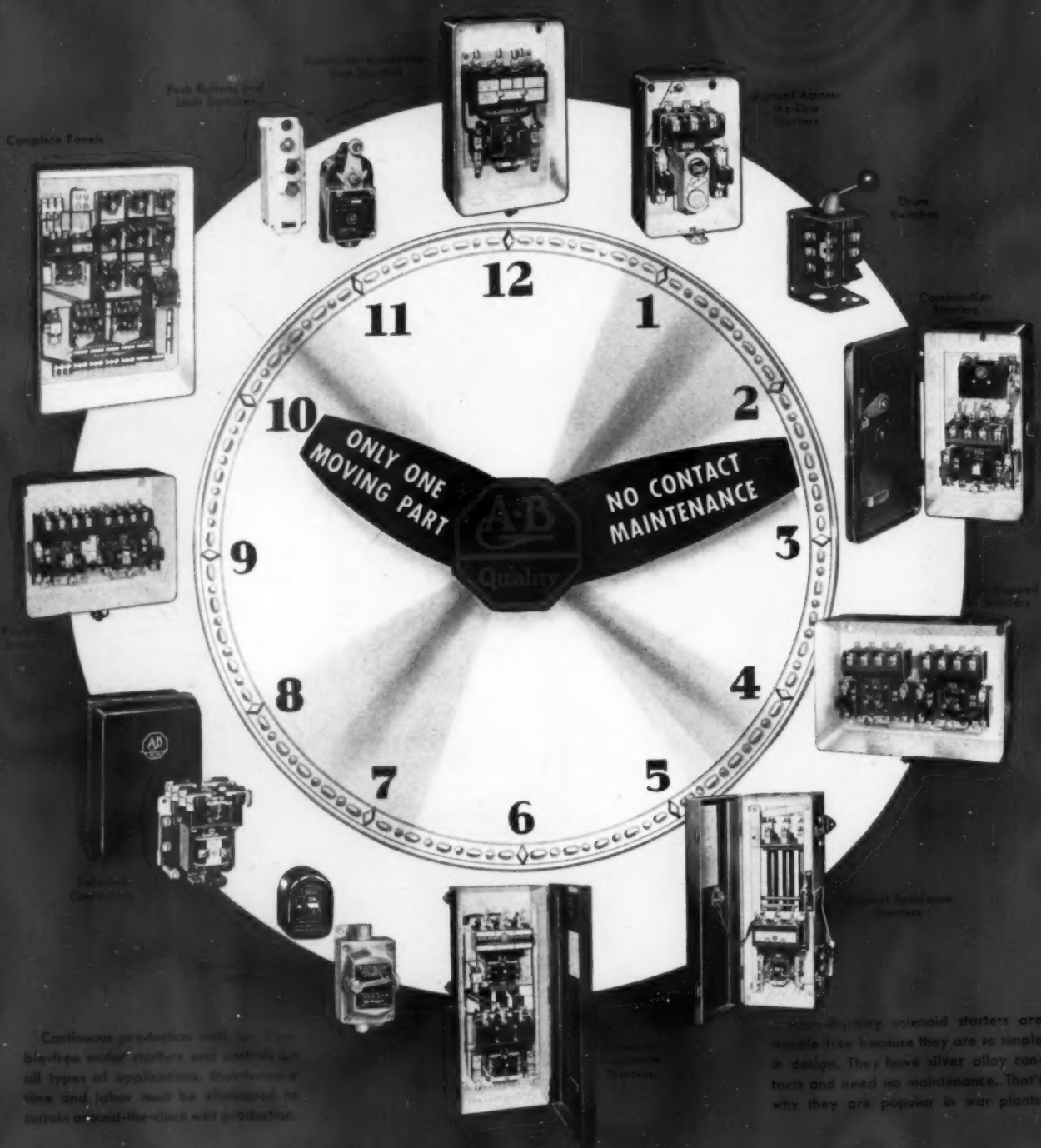
A-B

ALLEN-BRADLEY

PRECISION TYPE LIMIT SWITCHES

QUALITY

Around-the-Clock Production demands these trouble-free controls



Continuous production calls for trouble-free motor starters and controls on all types of applications. Maintenance time and labor must be eliminated. Install A-B around-the-clock unit production.

Allen-Bradley solenoid starters are trouble free because they are so simple in design. They have silver alloy contacts and need no maintenance. That's why they are popular in war plants.

Allen-Bradley Company, 1316 S. Second St., Milwaukee 4, Wis.

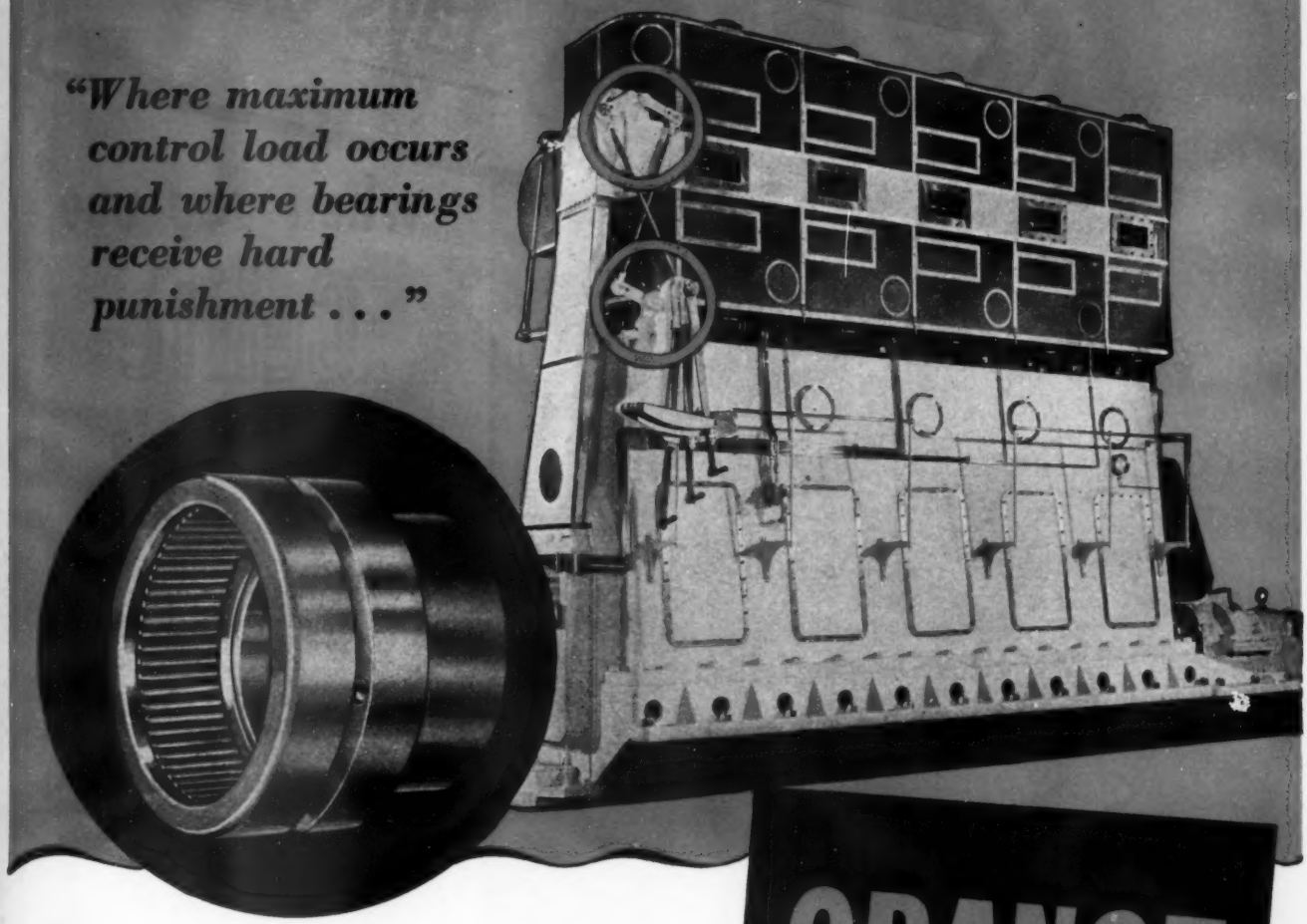
ALLEN-BRADLEY

MOTOR CONTROL

QUALITY

IN SKINNER MARINE UNAFLOW STEAM ENGINES . . .

"Where maximum control load occurs and where bearings receive hard punishment . . ."



THE giant 3,500-hp. 5-cylinder Skinner Marine Unaflow Steam Engine shown above uses Orange Roller Bushings at nine key spots in the controls, where service requirements are heaviest. The Skinner Engine Company has used Orange Roller Bushings since 1937 in the controls of its famous Unaflow engines, with excellent results.

The high load-carrying capacity in small space provided by Orange Roller Bushings makes it possible for standard bushings from stock to meet the exacting needs of this application, within available design space.

To protect rotating parts in your equipment against friction, wear and faulty operation, specify Orange Roller Bushings for smooth, quiet, long-life operation. Consult our engineers on any application. Send coupon for Engineering Data Book showing all types and sizes.

ORANGE ROLLER BUSHINGS

ORANGE ROLLER BEARING CO., INC.
ORANGE • NEW JERSEY

Mail Coupon for Engineering Data

Orange Roller Bearing Co., Inc.,
Orange, N. J.

Please send me your Roller Bushing Data Book

Name..... Title.....

Company.....

Address.....

City..... State..... A M

Cutting oil stays clean...

when you use Celite Filter Aids

It's the new, simple, economical method of continuous oil clarification

JOHNS-MANVILLE engineers have found that, while many devices do screen out the metal cuttings, they do not get rid of the tiny, colloidally fine particles that form in the oil. These small fragments slip through unhindered, and cause the most trouble.

To correct this, Johns-Manville has perfected a simple, low-cost way to eliminate completely these particles from the cutting oil. The result is that you can have refinery-clean oil flowing on the cutting surfaces at all times.

Celite Filter Aids are easily used. No complicated machinery is necessary. Celite forms a microscopically fine screen in the filter and traps all the dangerous suspended matter. The cutting oil flows through the screen swiftly, clean as new.

Celite is immediately available from 20 key points in the United States. Get the full details today on this new, better way to clarify cutting oils and industrial lubricants. Send for complimentary Celite folder FA-23A. Also samples and prices. Johns-Manville, 22 E. 40th St., New York 16, N. Y.

CELITE has these 8 big advantages

1. **Increases** tool life.
2. **Saves on labor** ordinarily needed for tool changing and sharpening.
3. **Aids** in close precision tooling.
4. **Cuts down** on rejects.
5. **Saves oil** which otherwise would be discarded.
6. **Does not remove soluble additives** contained in many new oils.
7. **Reduces danger** of dermatitis.
8. **It can be used** in any standard-type pressure or vacuum filter.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville CELITE FILTER AIDS

When it's Reveille for BEARINGS...

● Just like the soldier in camp, Bunting Bronze Standardized Bearings and Bearing Bronze Bars are on call in stockrooms of wholesalers and Bunting warehouses all over America.

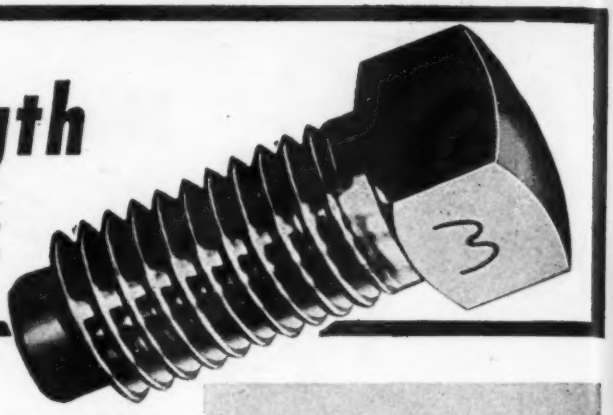
Completely machined and finished, in many sizes, these Bunting Bearings and Bars save priceless time, labor and costly shutdowns in production and maintenance of machine tools, industrial machinery of all kinds and electric motors of all sizes and makes.

The Bunting catalog gives complete specification data—makes ordering easy from the many different sizes listed. Write for it. The Bunting Brass & Bronze Company, Toledo, Ohio. Warehouses in Principal Cities.

Bunting

BRONZE BUSHINGS • BEARINGS • PRECISION BRONZE BARS

Added Strength Saves Replacements



These Screws Have a Place in Your Plant

Where tremendous gripping power is necessary and projecting heads present no hazard, there is no substitute for just plain strength. Broken screws, upset points and fatigue failure can be avoided by specifying stronger screws.

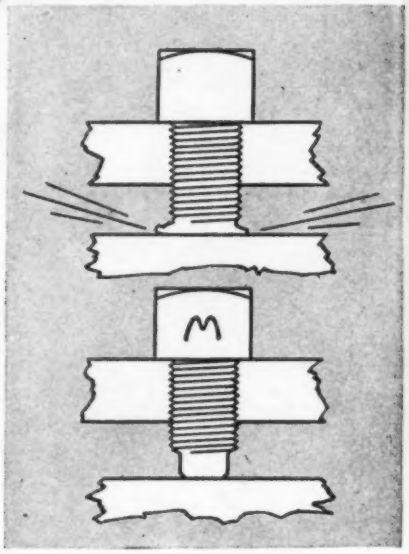
Mac-its

PRONOUNCED "MACK-IT"

OTHER MAC-IT PRODUCTS INCLUDE:
Hexagon Socket Cap Screws • Hexagon Head Cap Screws • Hollow Set Screws Hollow Pipe Plugs • Stripper Bolts

Mac-it Square Head Set Screws are heat-treated for maximum torsional strength and to resist upsetting of the points. A ⅝" Mac-it, for example, has a gripping power of more than 25 tons!

4321



Strong, Carlisle & Hammond Company Cleveland, Ohio

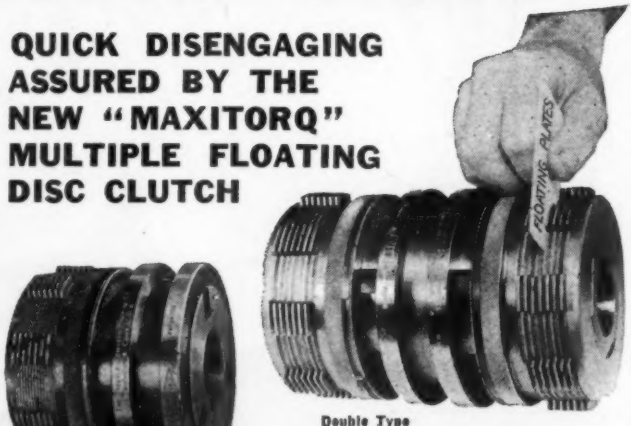
CAMS

LET the largest, most completely equipped cam milling plant in the mid-west handle your cam problems. All sizes of drum, face, groove or other styles of cams cut to order in quantities of one or one thousand. Send specifications or blueprints for a quotation on your requirements.

KUX MACHINE COMPANY
3930-44 W. HARRISON, ST. CHICAGO, ILL.

THE JOHNSON FRICTION CLUTCH

QUICK DISENGAGING ASSURED BY THE NEW "MAXITORQ" MULTIPLE FLOATING DISC CLUTCH



Single Type

Double Type

This recent Carlyle Johnson development features floating discs, manual assembly, simple adjustment and smooth, easily controlled engagement.

In the wet type, all discs are of hardened steel and run in lubricant; dry type with alternate discs of steel and self-lubricating bronze. Separator springs between active discs assure quick disengaging and prevent excessive drag.

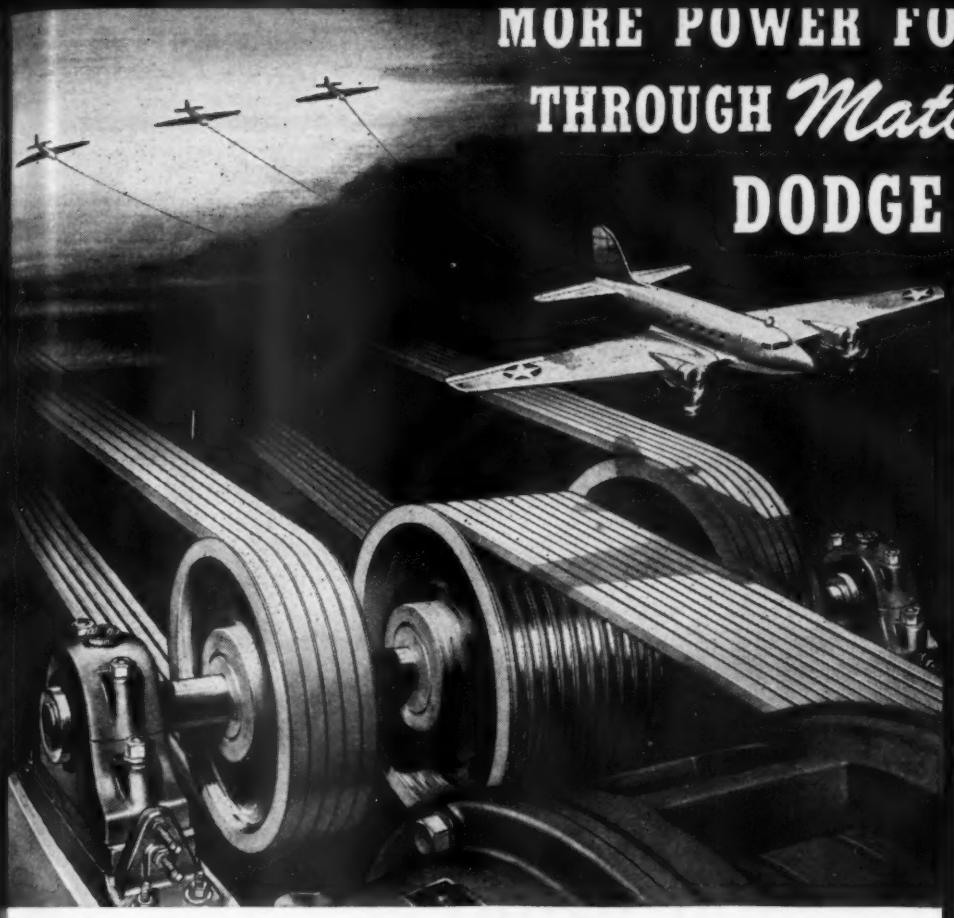
"MAXITORQ" Clutches represent a distinct advance in this type of mechanism and are applicable for all types of power transmission where smooth operation and quick action are required. Made in capacities from ½ HP to 5 HP at 100 R.P.M. in single, double and cut-off coupling types.

Investigate Today! Send for detailed specifications and dimension sheets

WRITE FOR MULTI DISC CLUTCH CATALOG NO. 112 OR CONSULT SWEET'S OR THOMAS' REG.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.

MORE POWER FOR VICTORY THROUGH *Matched-Quality* DODGE D-V DRIVES



Matched to Get More *Battle Power* Out of Horsepower

In thousands of war production power transmission installations, Dodge Matched-Quality D-V Belts and Sheaves are delivering maximum developed horsepower to the point of production, to create more *battle* power and hasten Victory. Because sound engineering is combined with precision manufacturing, Dodge Matched-Quality D-V Drives have proven efficient, economical and able to stand the punishing 'round-the-clock performance demanded today.

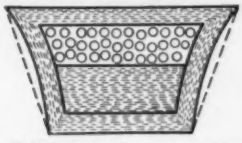
You Get These *Advantages* In Dodge D-V Matched Drives

1 — Sheaves (in metal or "Victory" wood) have precision groove diameters, matched with D-V Belts, for uniform belt tension; each belt pulls its share. 2 — D-V Belts have concave sidewalls which, when flexed around sheave, form straight surface for full contact with flat sides of grooves; full transmission of power; longer belt life. 3 — Clean, noiseless drives, requiring no lubrication of any kind . . . no oil leakage or throwing of lubricant to damage work or rot belting. 4 — D-V Belts, cured under tension, require no adjustment, last longer; won't sag or slip. 5 — Matched sheaves and D-V Belts form complete modern power transmission unit backed by one responsibility: DODGE!

See Your Local Dodge Distributor or Write For Data to

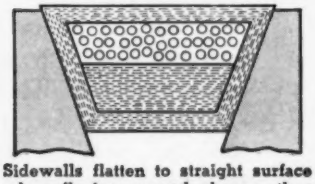
DODGE MANUFACTURING CORPORATION, Mishawaka, Indiana, U.S.A.

ON THE STRAIGHT RUN



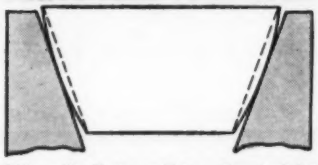
Dodge D-V Belts have concave sidewalls.

ON THE D-V MATCHED SHEAVE



Sidewalls flatten to straight surface when flexing around sheave, thus providing full flat contact between belt sides and sheave-groove.

CONCAVE SIDEWALL PREVENTS THIS CONDITION



Sidewalls that are flat on the straight run, bulge in center as they flex around sheave, thus making only partial contact with groove, and causing undue wear.

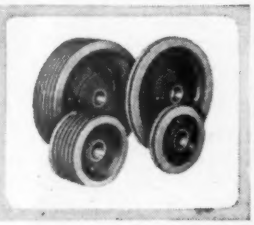
EQUAL TENSION IN DODGE D-V BELTS

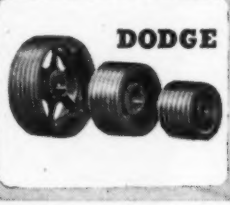
Correct engineering and precision manufacturing of both D-V Sheaves and D-V Belts ("Matched Quality") assure even tension on all belts of D-V Drives.

RESULT OF UNEQUAL TENSION

If V-Belts and Sheaves are NOT matched, some belts will be too loose, others too tight; unequal tension means power loss and undue wear.

DODGE VICTORY WOOD *Matched* **D-V SHEAVES**





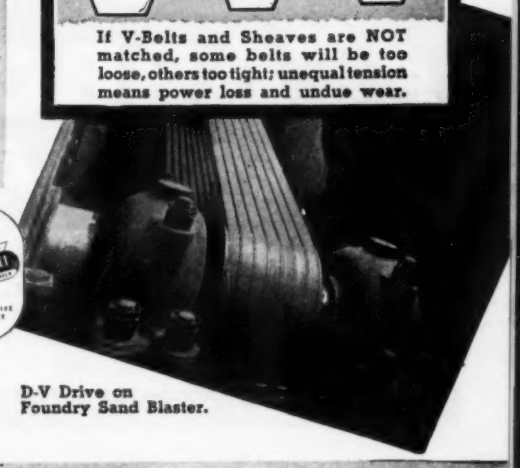
DODGE CAST IRON PRECISION *Matched* **D-V SHEAVES**

DODGE

MISHAWAKA

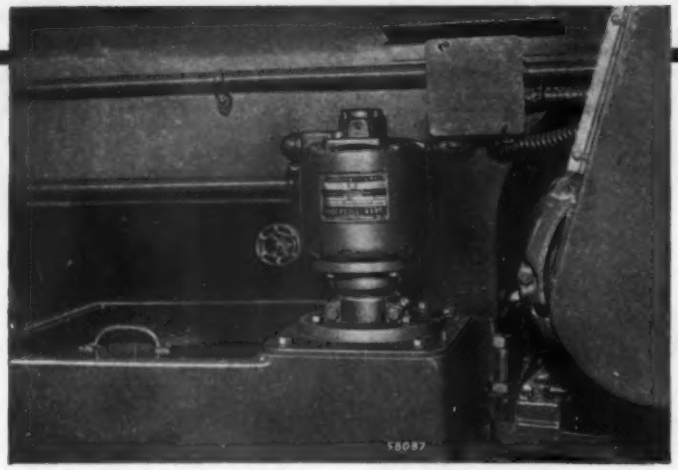
THROW ALL YOUR SCRAP INTO THE FIGHT! BUY MORE WAR BONDS!

THE RIGHT DRIVE FOR EVERY JOB



D-V Drive on Foundry Sand Blaster.

PUT *ALL* YOUR POWER IN THE JOB



Forgotten!

This coolant pump has been forgotten by everyone except the maintenance crew which lubricates it at regular intervals. And why shouldn't it be forgotten—it's always on the job—the machinist always has all the coolant he wants—the repair crew has never had to look at it.

Ingersoll-Rand coolant pumps are made so that once properly installed they can be forgotten. Before that the engineering department has carefully checked to see that it is the right pump for the job. The manufacturing department has made them strong and dependable.

An Ingersoll-Rand engineer will be glad to recommend a suitable pump for your application. Ingersoll-Rand Company, Cameron Pump Division, 11 Broadway, New York, N.Y.

Ingersoll-Rand

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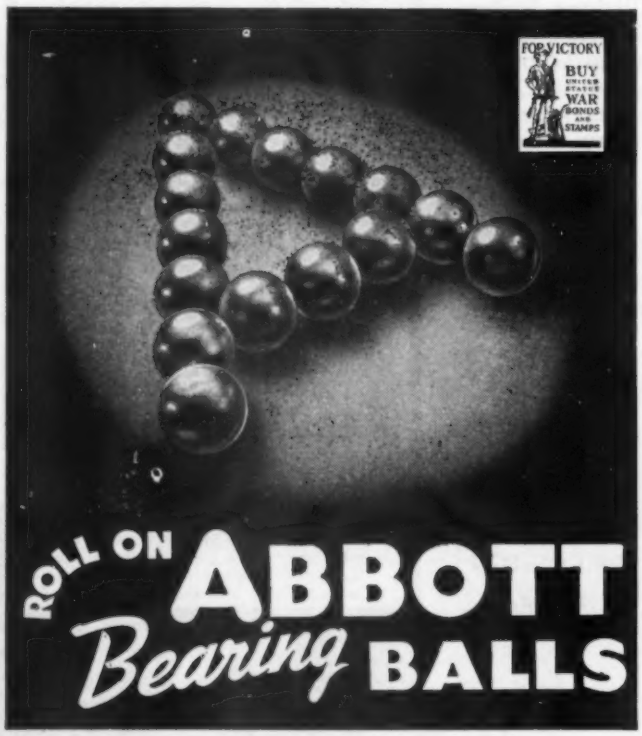

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Estimates of Delivery gladly given.

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FROM PUMP WORRIES, TOO

WITH TUTHILL MODEL C GENERAL PURPOSE PUMPS

Never before has the dependability and economy of Tuthill General Purpose Pumps meant more to industry than today. These positive-displacement, internal-gear rotary pumps are simple in design, compact and built to take it. Operate efficiently in either direction of rotation. Available in 8 sizes from 1 to 200 g.p.m. at pressures up to 100 p.s.i. on non-corrosive liquids. Direct drive, belt drive, V-belt units and stripped models. Write for Model C Catalog.

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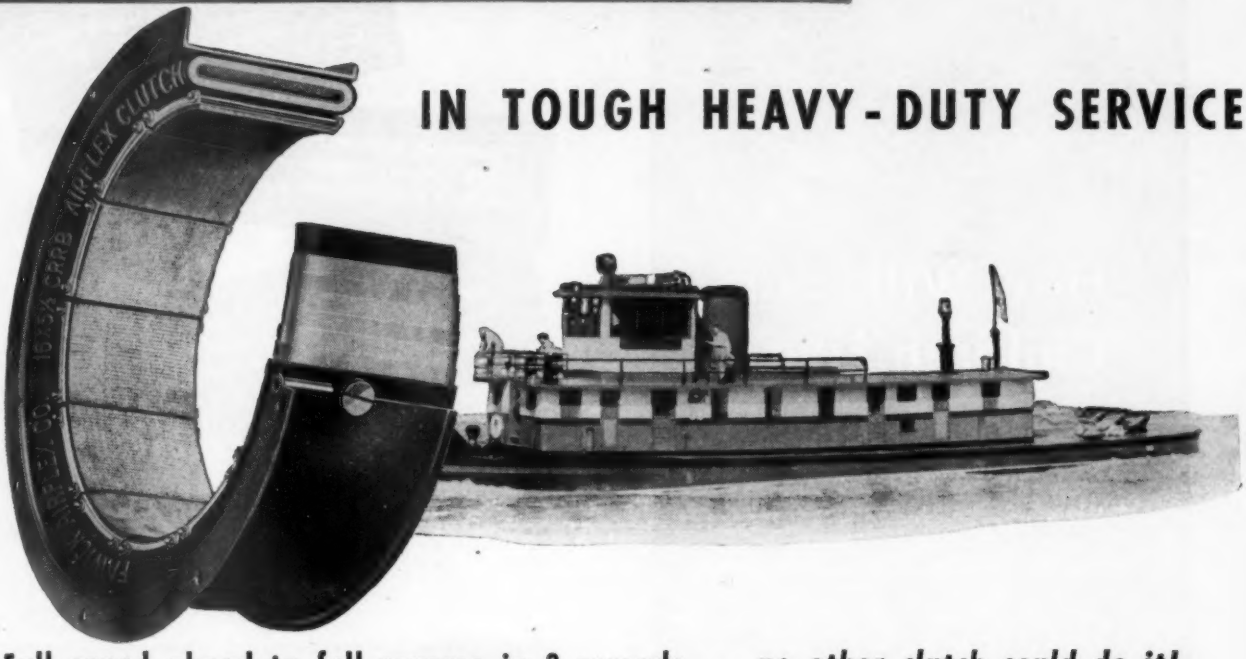
IN TOUGH HEAVY-DUTY SERVICE



Full speed ahead to full reverse in 3 seconds . . . *no other clutch could do it!*

This tug—typical of hundreds of Navy and Merchant Marine vessels—is proving every day that the Fawick Airflex Clutch handles heavy service jobs with entirely new standards of efficiency and economy.

The Fawick Airflex Clutch protects both prime mover and driven member against shock, strain and vibration—through controlled air pressure.

No moving parts, no arms, levers or toggles, no lubrication required. Maintenance costs very low. Operates as clutch, brake, slip clutch or flexible coupling.

For any heavy-duty application—on any machine—send us details and we'll gladly recommend the Fawick Clutch or Brake that best fills the need.

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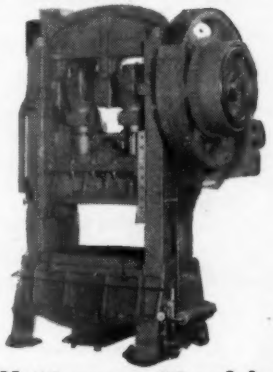

For All Heavy Machinery

On Punches, Shears, Turbines and severe-duty drives, Fawick Airflex Clutches and Brakes are compact, silent, smooth and shock-free. They slip readily under overloads and save on power.

12 IMPORTANT ADVANTAGES

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2. Flexible control by air.
3. No adjustments or oiling—low maintenance.
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5. Corrects misalignment automatically.
6. Smooth starting—no jerks.
7. Runs cooler—uniform pressure.
8. Controls torque by air pressure.
9. Greater capacity—more compact.
10. Remote control by air valve.
11. Replaces couplings.
12. Acts as clutch, slip-clutch or brake.

FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

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That's easy! They'll live better than you just as certainly as you live better than your parents. American industry has put the car, the refrigerator, the radio and other conveniences within the reach of all. After the war, the three-plant facilities of the Weatherhead Company will be prepared to help you build these products again and—mark this! —many strange new devices which one day will make your life, and your children's lives, pleasanter in scores of ways.

Look Ahead with

Weatherhead

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STANDARD MOTORS Pumps with motors for all regular voltages and cycles, two or three phase, shipped promptly.

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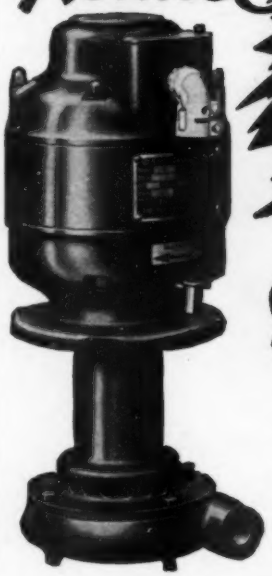

GUSHER COOLANT PUMPS

A copious flow of coolant saves your tools and speeds production. Gusher Vertical Centrifugal Coolant Pumps are dependable and efficient. They handle chips and grit. Other outstanding advantages. There's a type and model for your needs. *Write*

Model 9040 — Equipped with integral flange bracket for reservoir cover or bed-plate mounting. Designed for installation interchangeability with Gusher Model 1-P3. Available in any current characteristics, including 25 cycle, 1, 2, or 3 phase. Totally enclosed ¼ h.p. motor. Two lengths (from flange) 6-7/16" and 8-7/16". Available in ½" or ¾" pipe size discharge.

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LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

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It takes a lot of muscle and coordination to ride a rough working, badly lubricated air tool. And that kind of ride takes you nowhere. You can tame it with the Norgren

LUBRO CONTROL UNIT

Make it operate with smooth-flowing power of a thorobred! Keep it working that way by oiling the air that drives the tool . . . the one right method of lubrication. Also protects against destructive corrosion when tool is idle.

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The Norgen LUBRO CONTROL UNIT combines air filter, pressure regulator, and lubricator. (Each can be used separately.) Sizes for every purpose.

Automatic; starts and stops with the tool. Sight feed; visible supply and service. Write to C. A. NORGREN CO., Denver, Colo., for latest catalog and price information.

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If you have a casting problem, why not call in our engineers. They'll show you the quick, low-cost way to solve it.

*Bridging the gap between steel and cast iron, ABSCO Meehanite combines the best properties of these two materials. It is available in 21 different types under 4 classifications: General Engineering — Heat Resisting — Wear Resisting — Corrosion Resisting.

AMERICAN **Brake Shoe** COMPANY

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It's an unknown quantity in men fighting against odds. In the crucial moments, we only know it takes all they've got to come through. *How much* they've got is the measure of their endurance and heroism. . . But in hollow screws, the measure of endurance is taken scientifically in the Allen laboratory.

Here, Allen screws must prove *exactly* how much punishment they can take. It's registered on the dials of testing machines, — testing for tensile strength, for yield point, elongation, reduction of area, Izod impact and Rockwell hardness. Your Industrial Distributor sells the screws that *come through!*

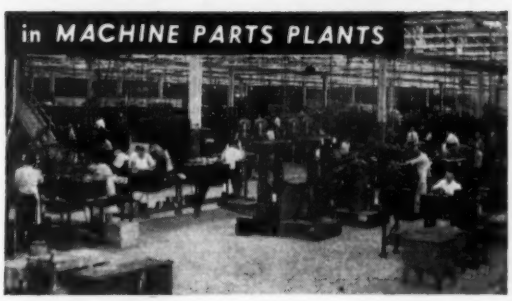
The Allen Mfg. Company ★ ALLEN ★ Hartford, Conn., U. S. A.

Here Are

A Few of the Industries

in which

GATES V-BELTS *of* Synthetic Rubber



-and Many Others

Have Been Tested and *Proved*

by *YEARS* of *SERVICE*

Five years before natural rubber supplies began to be curtailed, Gates was already supplying many industries with large quantities of V-Belts made entirely of synthetic rubber.

The synthetic rubber used was a very special one and was not used as merely a substitute for rubber. It was used because, in many applications, it is greatly superior to natural rubber. For example, under severe conditions of heat and oil, the Gates special synthetic V-belt actually outwears belts of natural rubber by as much as 230%.

This is the record *not* of just a *few* belts over a *short period* of time. It is the record of *thousands* upon *thousands* of Gates special synthetic rubber V-belts that have now been tested and proved by *years* of service in Aircraft Factories, in Ordnance Plants, in Steel Mills, in Machine Parts Plants, in Lumber Dry Kilns, in Food Processing Plants—in every kind of installation where heat and oil conditions are *excessively severe*.

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You have only to look in your telephone directory and call the Gates Field Engineer. He will put at your service the full benefits of Gates knowledge and experience *without the slightest obligation*.

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ready for your use!

DIE ENGINEERING LAYOUTS and FORMULA

that are proving their value right now in toolrooms throughout the country

. . . **A new guide** presenting drawings and photographs with detailed explanations of 90 per cent of all the key designs used in tools for presswork.

. . . **Hundreds of sketches,** complete drawings and photographs made by recognized leaders in the field show the work—the die—the method of manufacture.

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DIE ENGINEERING LAYOUTS and FORMULAS

By C. W. HINMAN

Former Chief of Jig and Fixture Design, Western Electric Co., Chicago; former Chief Tool Engineer, Automatic Electric Company, Chicago.

497 pages, 6 x 9, 366 illustrations, $5.00

A PRACTICAL toolroom engineer brings you in this new book the gist of his 40 years' experience in interchangeable manufacture. Here are drawings and photographs with detailed explanatory text of 90 percent of all the key designs used in tools for presswork. The book includes all the necessary mathematical formulas for laying out the assembled dies in a clearly rendered drafting technique—shows dies for producing war equipment that reveal basic principles of many key designs that will have wide application in fabricating an endless variety of small precision parts after the war—shows you the drafting shortcuts that war production has worked out. Nearly all the tool designs are complete working drawings from which many of the tools described, or similar ones, could be built from the dimensions given.

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- variety of layouts for scrap-strip designs
- explanation of how to make die drawings by a short method especially adapted in drafting assembly dies
- methods for designing and drafting progressive dies widely used in blanking and forming parts for small guns and fabricating endless variety of small precision parts
- section of method of manufacturing small calibre shells, also of drawing large cartridge cases
- etc., etc.

Those who are familiar with HINMAN'S

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and

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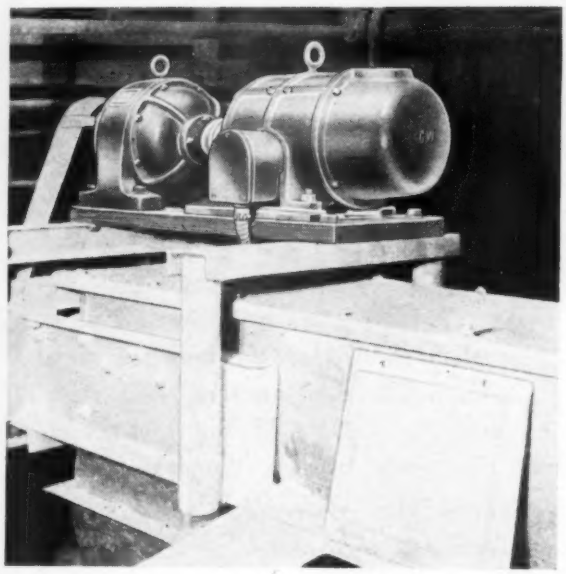
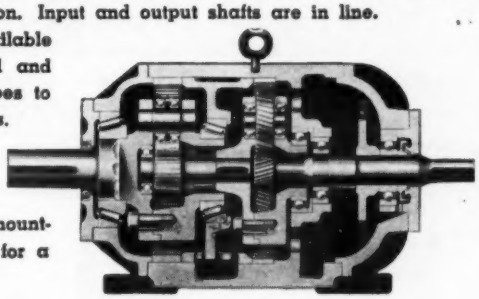


Philadelphia Planetary Speed Reducers are compact in design yet rugged in construction. Input and output shafts are in line. These units are available in single, compound and double reduction types to fit a variety of needs. Our catalog 100 gives more complete information and shows various mounting methods. Write for a copy.



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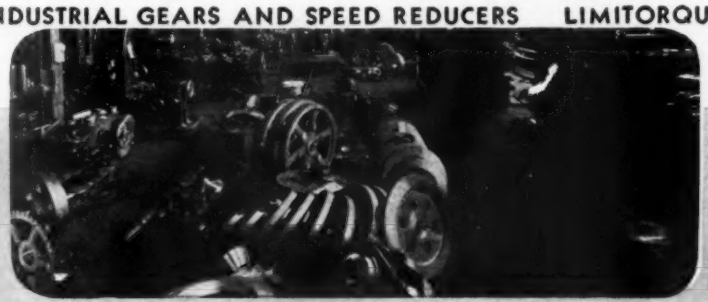
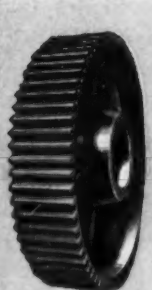


***Philadelphia* LIMITORQUE CONTROL** operates all types of valves, etc., safely, economically, from convenient stations.



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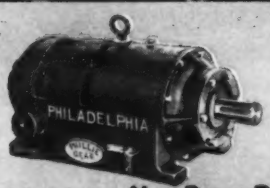


***Philadelphia* MOTOREDUCER** The economical self-contained drive, Horizontal or Vertical types — various ratios and horsepowers.

***Philadelphia* WORM GEAR SPEED REDUCER** right angle drives — vertical or horizontal. Wide range of ratios and horsepowers.

WHERE EVERY INCH OF SPACE IS RATIONED

In the famous motor torpedo boats—the fastest warships afloat—compactness and lightness are essential features of every part. That is why the Sterling Admiral engines which drive these boats use Farrel-Sykes continuous tooth herringbone gears—the *Gear with a Backbone* — for the camshaft drive.

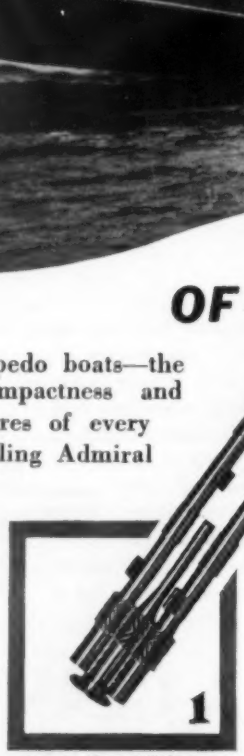


Fig. 1—Farrel-Sykes continuous tooth herringbone gears used for camshaft drive in Sterling engines.

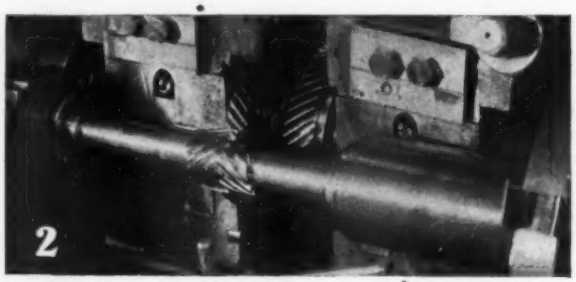
The greater effective face width of Farrel-Sykes gears gives them the high load-carrying capacity needed in the small space available, and provides the extra strength and durability to stand the high speed, pulsating torque and endless hammering of valve actuating mechanisms, which is typical of this application.

Precision generation by the Sykes process, combined characteristics of overlap or interlacing of the teeth, gradual engagement and inclined line of pressure contribute to smooth, quiet operation and maintenance of correct tooth action throughout the life of the gears.

The gears are made integral with their shafts, but the long shaft extensions do not interfere with rigid mounting of the work and accuracy of generating the teeth, because the main work spindle of Farrel-Sykes gear generators has a bored hole to accommodate such shafts.

Farrel-Sykes continuous tooth herringbone gears are made in any size from ¼ inch to 20 feet in diameter for industrial as well as marine service.

Fig. 2—Gears integral with shafts of any length are easily generated by Farrel-Sykes gear generators.

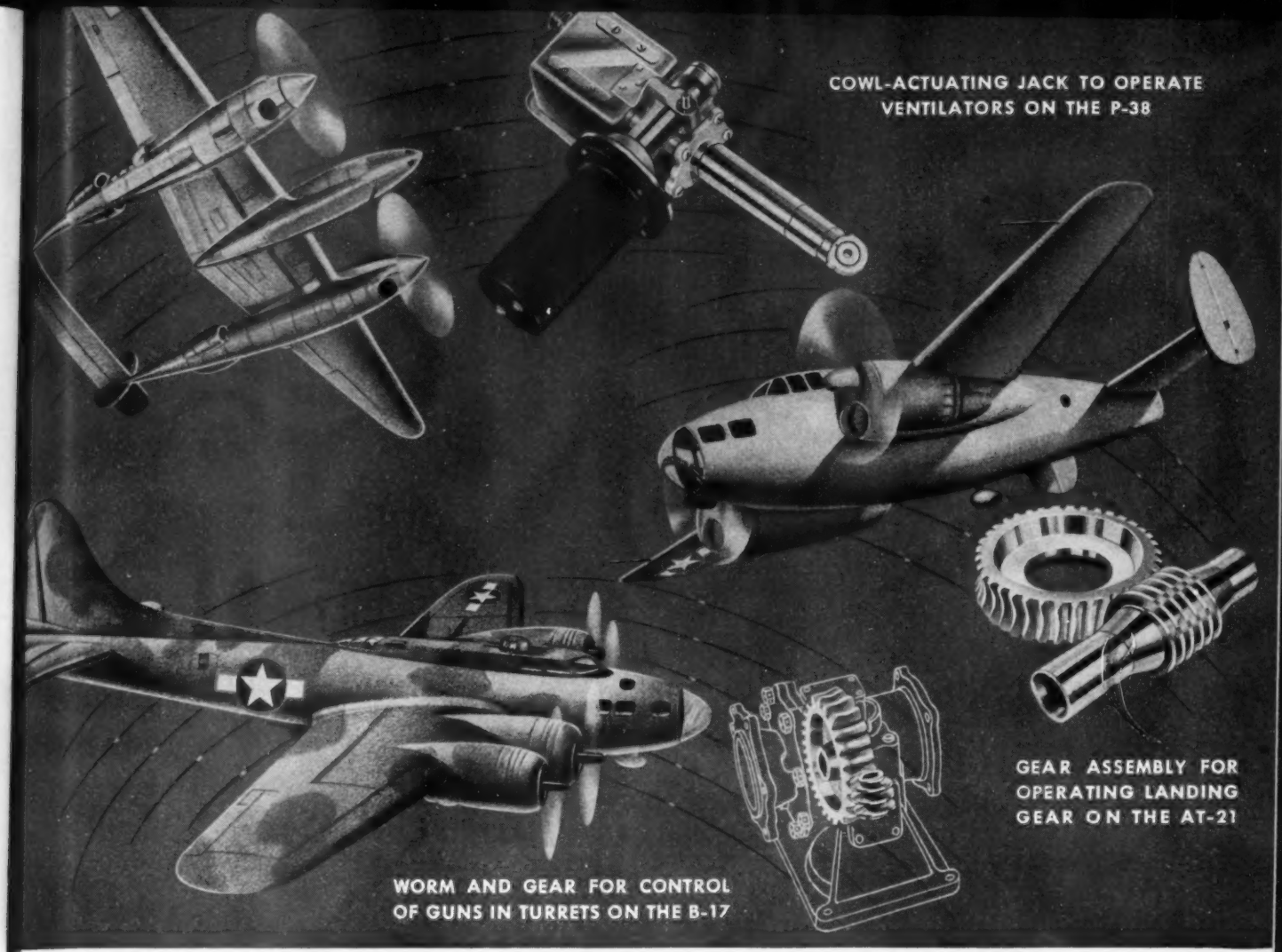


FARREL-BIRMINGHAM COMPANY, INC.

ANSONIA, CONN. • BUFFALO, N. Y.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. -- Branch Offices: New York, Pittsburgh, Akron, Los Angeles

FARREL — The Gear with a Backbone


COWL-ACTUATING JACK TO OPERATE VENTILATORS ON THE P-38
GEAR ASSEMBLY FOR OPERATING LANDING GEAR ON THE AT-21
WORM AND GEAR FOR CONTROL OF GUNS IN TURRETS ON THE B-17

Production of Precision Aircraft Devices

SOLVING intricate production problems called for in the manufacture of high-precision aircraft devices is another contribution Foote Bros. Gear and Machine Corporation is making toward speeding the day of Victory.

Precision gears for reducers for azimuth and elevation control of guns in turrets in the B-17 bombers—gear assemblies to raise and lower the landing gear of the AT-21 trainers—cowl actuating jacks to operate ventilators on oil coolers on P-38 interceptors—all these devices call for light weight coupled with extreme precision.

Foote Bros. engineering experience and manufacturing "know-how" acquired in the production of precision gears in tremendous quantities for Pratt & Whitney aircraft engines assure the production of these special devices in the quantities required to meet the ever-increasing demand of our global air force.

It is natural that many manufacturers of airplanes, airplane engines and airplane parts recognize in Foote Bros. a logical source for gears and devices where light weight and extreme precision are essential.

After the war, the experience gained in the manufacture of such gears and devices promises American manufacturers a new era in the economical transmission of power.

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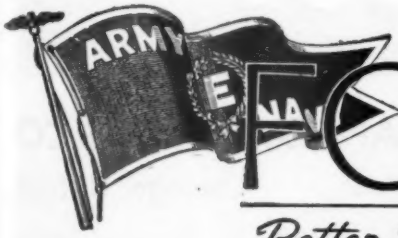
5225 South Western Boulevard • Chicago, Illinois



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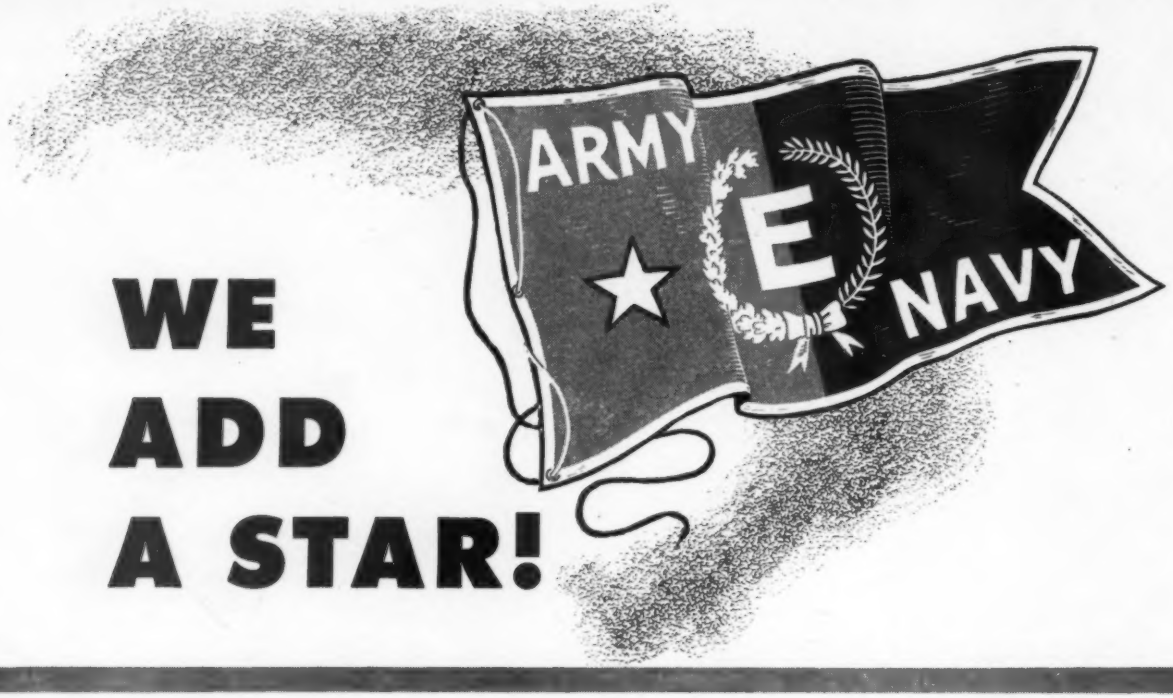

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We proudly acknowledge our having received these awards and sincerely appreciate this opportunity of *again* serving our country.

D.O.James precision made gears are important controlling factors in attaining the utmost fire power and efficiency of many different types of the guns used by our armed forces.

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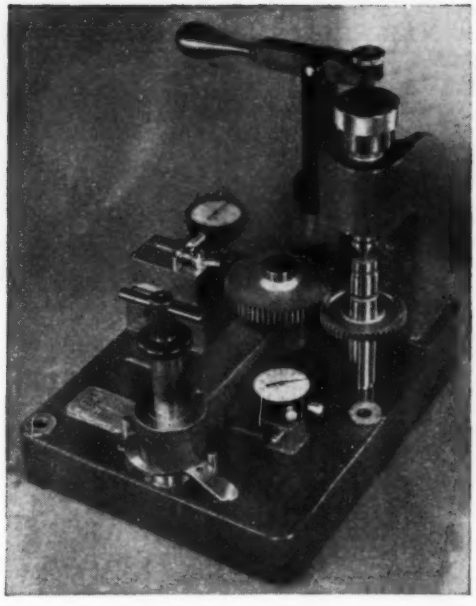

Almost everything that moves, uses

GEARS

Tanks rolling from invasion barges—jeeps dashing and bouncing up the beaches—planes covering the attack from above—more barges, filled with our warriors, speeding toward the shore —mounted guns blazing destruction to the enemy—these and many more of the Victory-producing products made in America for the United Nations, rely upon GEARS for the success of their motive power. Not just gears, but gears made as nearly perfect as human skill and precision machinery can produce. For the checking of production gears, VINCO has made, during the past quarter century, precision master gears and gear rolling fixtures. These examples of VINCO quality represent the ultimate in the art of precision manufacture.

Millionths of an inch for sale by

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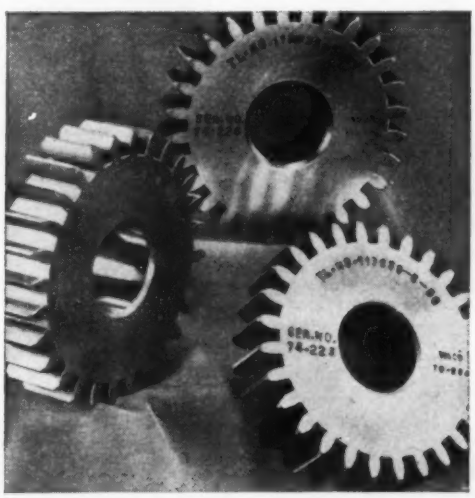

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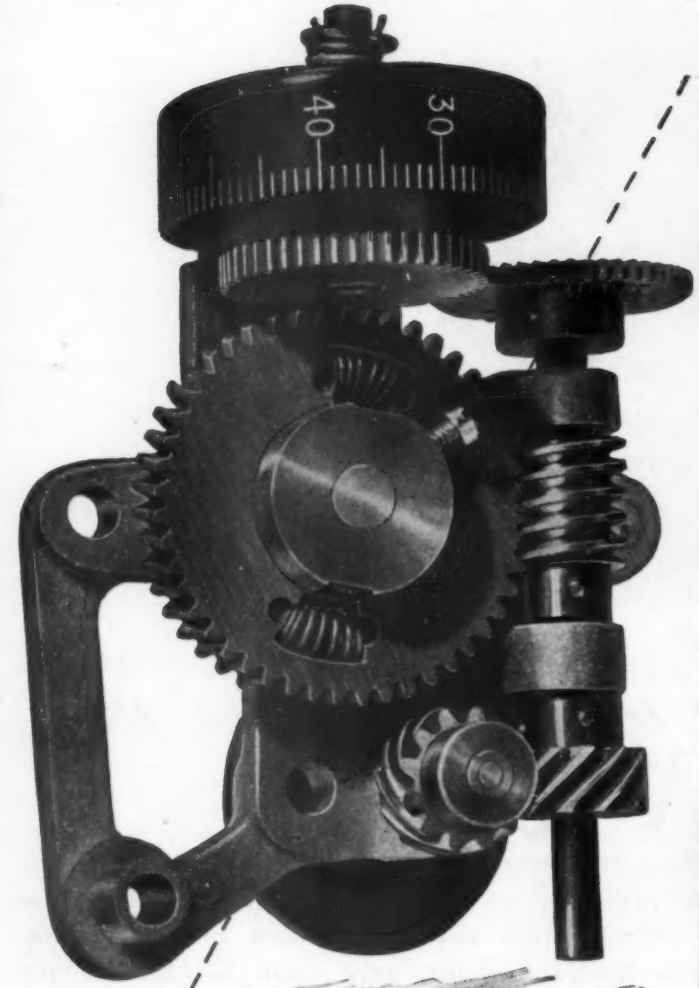

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CLOSE tolerance requirements in ordnance, instruments, aircraft and industrial materiel is one of the reasons for the tremendous demands for Cincinnati . . . Gears, Good Gears Only.

Yes, Cincinnati Gears mean definitely faster handling in assembly . . . They're "Right For The Job", because they are made specifically for each particular purpose.

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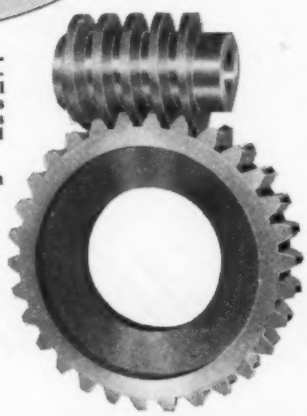

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In addition to spur gears, Earle manufactures the full range of gear types and sizes . . . in practically every gear material. Send for the Earle Gear booklet 42-G which contains full detailed information.

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Through every step in production, SIER-BATH PRECISION GEARS are inspected and checked for accuracy in every detail. The bull gear shown here is passing through its final inspection before shipment. It will be Oked for shipment only when it has met all specifications called for as well as SIER-BATH'S own high unwritten standards for quality.

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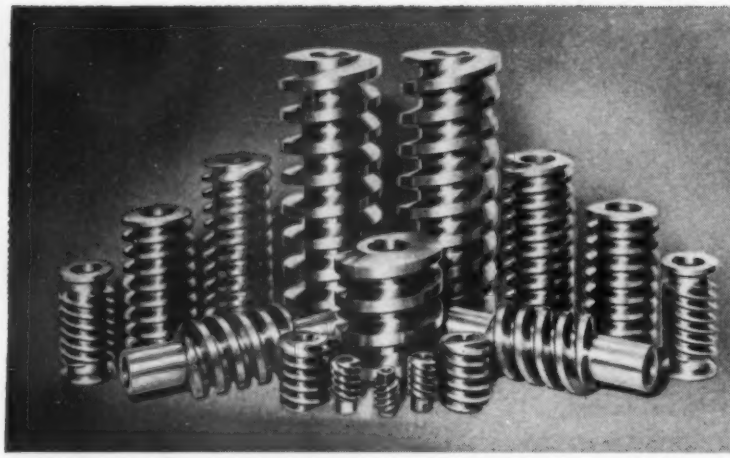

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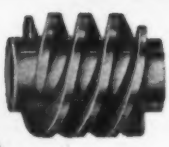

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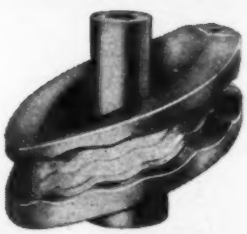
You plan and we execute—assuring speedy production, prompt delivery and reasonable price. Send blue prints or samples for estimate.



THE HARTFORD SPECIAL MACHINERY CO.
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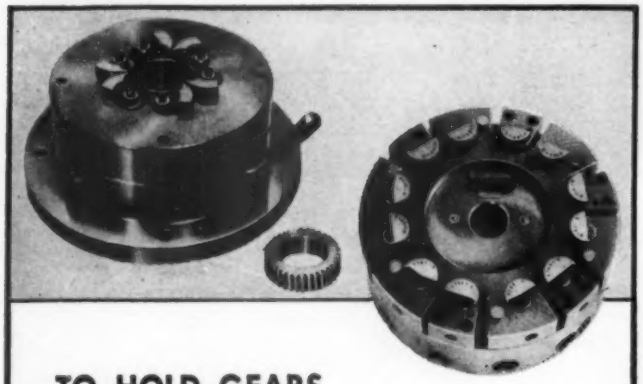

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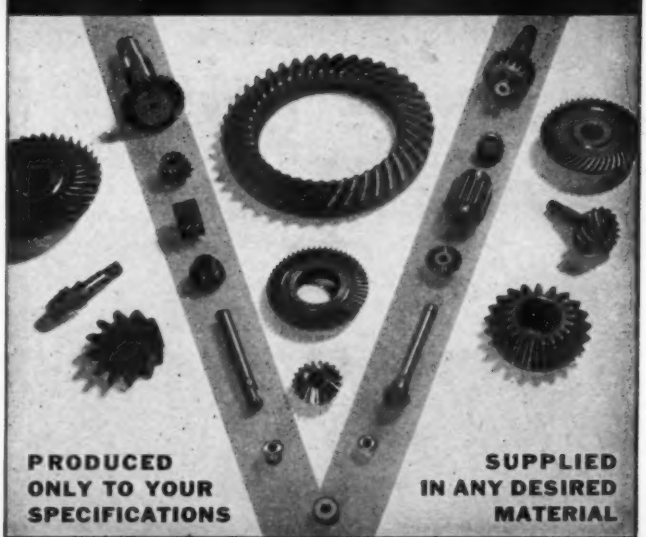

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GEARS, GEARS, GEARS. Small ones or large • Stahl Gear has only one standard of quality • the best. We invite you to talk over your "big" gear problems with us. Many users could testify that Stahl is "geared" to serve you well. *TRY US.*

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(14 to 96 D. P.)

This range logically embraces the gear components of many critical control devices essential to the war effort and this organization is proud of its contributions of such material in the program.

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Despite the continued growth of our gear business we are still in position to give each customer the attention they have a right to expect.

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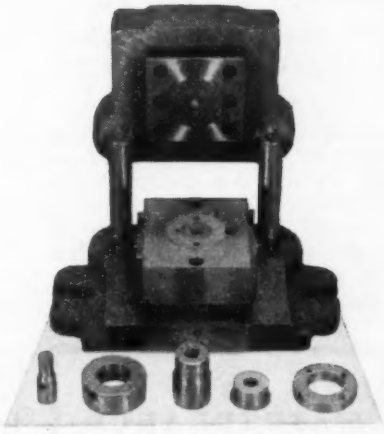

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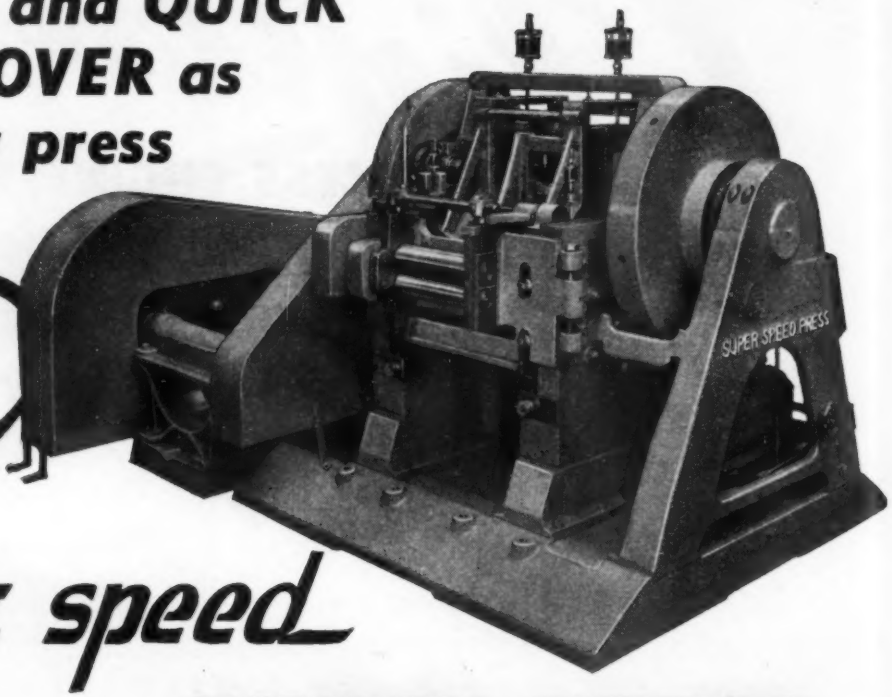

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WITH ONE DIE—
1000 BLANKS A MINUTE

SMALL PARTS—2 to 10 pieces per stroke—production as high as 10,000 PARTS PER MINUTE

The staggering speed of FERRACUTE'S SUPER SPEED PUNCH PRESS is likely to over-shadow the fact that this great producer is adaptable to short runs as well as long. It takes NO LONGER to change the dies than on conventional presses. This adaptability plus the *Super* Speeds can radically change your production picture.

SAVE 60% TO 80% ON DIE MAINTENANCE

SUPER SPEED users report that die life is increased and regrinding expense reduced 60% to 80%. SUPER SPEED can use your present blanking and standard progressive dies.

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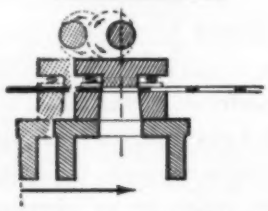

Punch and die travel with material

The die bed of the SUPER SPEED PRESS reciprocates in a horizontal plane, the amount of travel approximating the amount of feed per piece. The punch member takes its motion directly from the crankshaft, the amount of stroke being adjustable. This rotary motion of the punch face coincides at its lower arc with the reciprocating die on its forward stroke. Gripped by the stripper, the material is held between the punch and the die, the whole traveling forward horizontally as the punch penetrates the work, passes the center point and withdraws from the work, the stripper clearing the punch.

DELIVERIES ON SUPER SPEED CAN NOW BE SCHEDULED

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Piercing • • • • • Blanking
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SUPER SPEED PRESS CORPORATION DIVISION
For Over 80 Years
Manufacturers of Power Presses, Press Brakes and Special Machinery

Another use for MASONITE* DIE STOCK

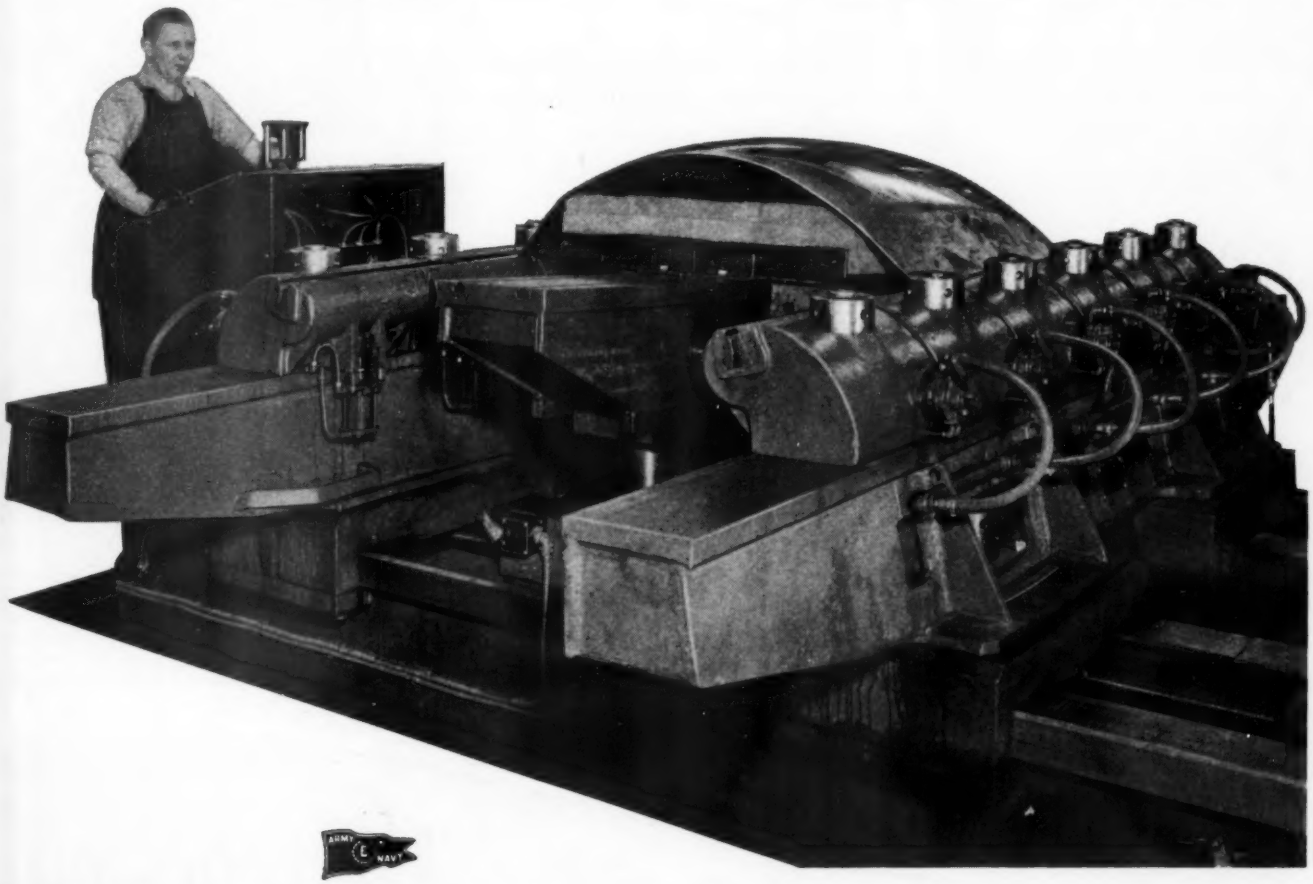
As America's amazing aircraft production soars to new highs, manufacturers find more and more uses for Masonite Die Stock.

Already widely employed by aircraft manufacturers to help shear and form airplane parts, this remarkably durable, light-weight, semi-plastic material is now being used for forms on stretching machines . . . permits easy handling of large forms . . . will not shrink, check or twist.

Manufacturers in many other fields, too, are saving time and money by using Masonite Die Stock for special types of mating dies, forming blocks, templates, jigs and fixtures.

Masonite Die Stock can be fabricated in pattern or metal shops with great speed . . . is available in thicknesses of ¼ to 2 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For further details, please mail coupon below.

This photograph shows how Masonite Die Stock is used to stretch and form sheet metal for airplane parts at the Grumman Aircraft Corporation.



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MASONITE CORPORATION *Dept. TE-12, 111 W. Washington St., Chicago, Ill.*

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If so

IT WILL PAY YOU TO INVESTIGATE

ETNA SWAGING MACHINES

WHAT IS SWAGING? ETNA Swaging Machines draw round solids or tubing down on a taper by a process of forging or hammering with revolving dies. Note particularly that material is *drawn* or reduced. This means that no metal is cut away . . . thus effecting savings in material and machining costs.

IS SWAGING ACCURATE? Yes. Parts handled on ETNA Swaging Machines can be held within limits of two to three thousandths of an inch in diameter . . . and parts can be produced in volume quantities on ETNA automatic or semi-automatic feed machines.

WHAT MATERIALS CAN BE SUITABLY SWAGED? Most Swaged parts are of round bar stock or tubing, but multiple sided stock can be handled. Previously formed blocks can be Swaged easily. ETNA Swaging Machines are widely used in shaping tubular housings and in the completion of small tubular assemblies.

Important too is the versatility of ETNA Swaging Machines. When present emergency conditions are past ETNA units can easily be applied to normal peacetime operations.

Write today . . . your request will bring complete information on ETNA Swaging Machines.

• Above are three examples of the varied jobs ETNA Swaging Machines are doing today. Top-knurling, tapering, and sizing army cot legs. Center-Swaging copper bands on 20 mm. shells. Bottom-Tube pointing, prior to drawing.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING

"Ask ETNA about Swaging"

THE ETNA MACHINE COMPANY

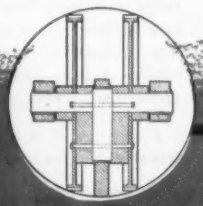
TOLEDO . . . OHIO

Only Verson TRADE MARK

FULL ECCENTRIC PRESSES

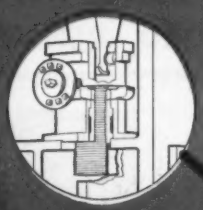
GIVE YOU *all* THESE CONSTRUCTION ADVANTAGES

There are five essentials to a good press: *strength, rigidity, endurance, accuracy* and *power.* The quality of a press depends upon the degree to which each of these "musts" are built into it . . . In the construction of Verson Full Eccentric Presses, nothing is spared to produce presses of maximum quality. Result: Only Verson Full Eccentric Presses give all of the following construction advantages:



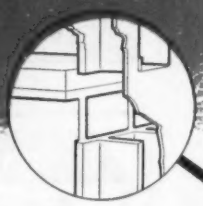
1. Verson builds the only Full Eccentric Press with renewable split-cap design bronze bushed main bearings.

2. Verson Full Eccentric construction provides maximum factor against shaft failure—there is no crankshaft to bend or break.



3. Barrel type adjusting screw which remains vertical at all positions of stroke, thus eliminating bending moment. Adjusting screw is extra long, well guided—equipped with buttress threads for maximum safety.

4. Allsteel Welded Frame, has greater strength and resistance to deflection because of the greater tensile strength and higher modulus of elasticity of steel plate. In Verson Allsteel Frame construction steel can be placed where it will do the most good. Of boxtype construction, with inner load-carrying plate much heavier than outer plate, maximum strength and rigidity are provided.



5. Air counter-balance to slide increases safety and insures smoother operation.

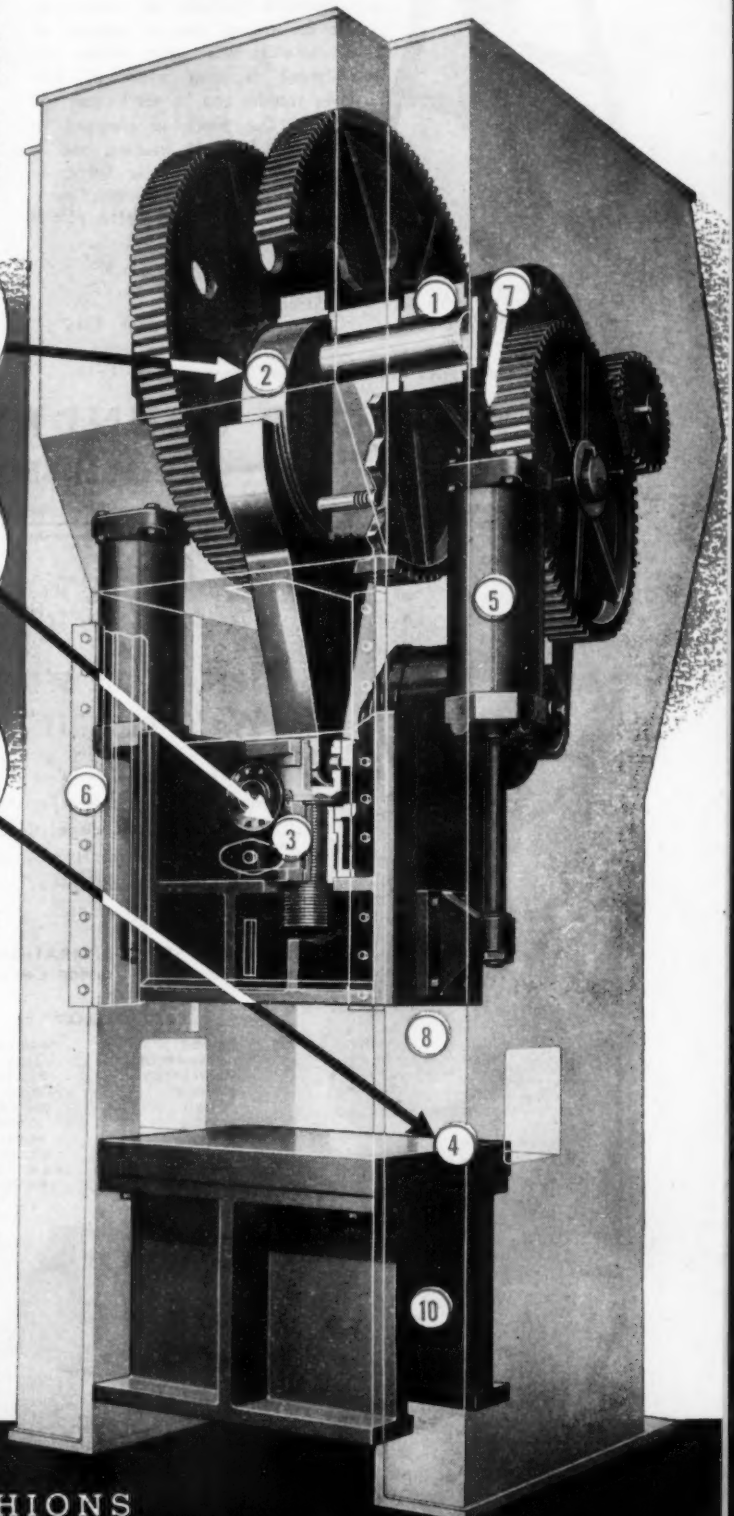
6. Extra long, bronze lined gibs increase accuracy and die life.

7. Verson Pneumatic Clutch and Brake Unit eliminates clutch and brake overlap.

8. Automatic Press Control.

9. Automatic Lubrication.

10. Verson Die Cushions in the bed.

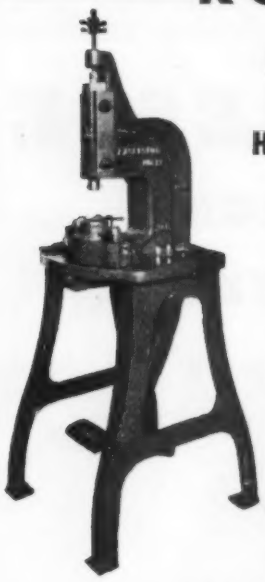


Verson Presses are built by the originator of all steel welded press construction. They are backed by more than 25 years of successful press engineering. Ask a Verson engineer to call and go over your press requirements with you—and send for the new catalog of Verson Full Eccentric Presses.

VERSON ALLSTEEL PRESS CO.
9316 SO. KENWOOD AVENUE • CHICAGO 19, ILLINOIS

POWER PRESSES · CLUTCHES
FORGING PRESSES · DIE CUSHIONS
HYDRAULIC PRESSES · PRESS BRAKES

ROYERSFORD - EXCELSIOR



PUT YOUR LIGHT METAL STAMPING ON THIS HEAVY RAPID FOOT PRESS

The Royersford-Excelsior No. 10 Foot Press meets all requirements in a machine for handling a wide variety of light work. Every detail has been developed to assure operating convenience and speed.

Features include an adjustable gib for taking care of plunger or machine surface wear; stroke adjustment is also provided; foot lever treadle can be set to suit operator. Die block is clamped to T-slot in base of housing and is machined to receive die holder or vise furnished with machine. Punchings fall into conveniently placed table drawer.

SPECIFICATIONS

Height—floor to table—2' 7". Stroke (Max.)—2".
Table Size—23¼" x 15". Capacity—½" through 1/16". soft steel.
Depth of Throat—3".

Immediate deliveries available. 12 different sizes available.

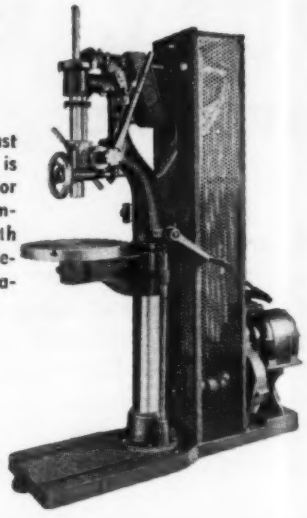
IMPROVED 21-INCH UP-RIGHT POWER DRILL

FAST AND ACCURATE
SIMPLE AND STURDY

Every modern convenience for fast precision drilling and easy handling is provided in this Royersford-Excelsior motor driven back-geared drill. It combines simplicity and operating speed with strength and rigidity and can be depended on to drill up to its 1½" capacity with utmost accuracy.

Gears are machine cut—bearings larger and powerful—change from a plain drill to a back-geared drill can be made by merely sliding the gears—spindle is provided with ball thrust bearings top and bottom, counterbalanced, and has automatic stop with quick return—table has quick action screw for raising and lowering.

Diameter of table 18"; spindle traverse 9"; spindle to table 29".



Full detailed specifications on these machines available promptly on request.

ROYERSFORD FOUNDRY & MACHINE CO., INC.

ROYERSFORD, PENNA.

NEED *Special Service* ON SPECIAL DIE SETS? *Call* "DETROIT"

In addition to making a complete line of standard die sets, we are especially well equipped to produce special die sets to your specifications. Send us your prints for prompt action—or call the "Detroit" man in your area.

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46 Styles—195,000 Sizes

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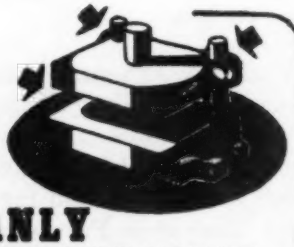

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Means Greater Accuracy In Your Production
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New KRW HYDRAULIC PRESS BULLETIN

Now Ready!

Typical pages from the new KRW Hydraulic Arbor Press Bulletin.

● Not only a complete catalog of the full KRW Arbor Press line, but an "idea book" for production men. Describes many new attachments, fixtures and special presses developed by KRW to speed war production. Illustrates the new 60-ton KRW Hydraulic Press, the 25, 50 and 75-ton sizes, and KRW Bench Type Presses in 1/2, 1 and 3-ton capacities. Write for your copy today!

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FOR SERVICE

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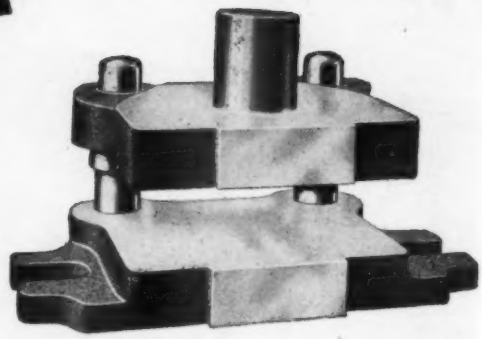
To speed up stampings for War Production. Producto Die Sets are available for quick assembly and shipment.

Hundreds of sizes for all types of Dies.

Orders should be sent to nearest assembly plant either Bridgeport or Detroit, also Die Supply 4747 Hough Avenue, Cleveland, Jamison Steel Corporation, Los Angeles and San Francisco.

Diemakers Accessories also in stock, Dowel Pins, Stripper Bolts, Socket Screws and Springs.



Also manufacturers of Producto Modern Machine Vises. Distributors of Dickerman Automatic Press Feeds.

THE PRODUCTO MACHINE Company

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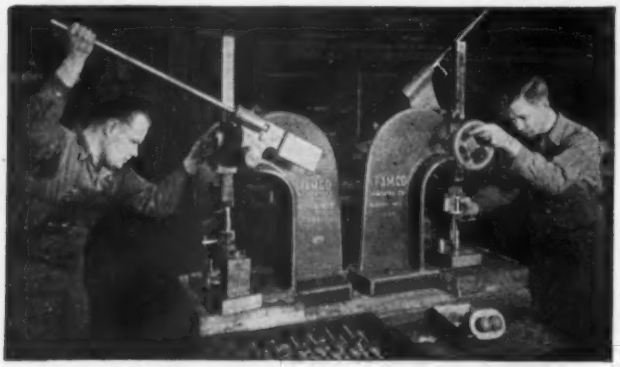


. . . FOR PRECISION SPEED IN ASSEMBLY OPERATIONS

Illustrated above are two types of Famco Arbor Presses used for final assembly operations on marine fire pumps at the Evinrude Motors plant. Famco's exclusive adjustable gib control for front and side plate adjustment assures perfect ram alignment at all times . . . precision speed on every job. Write for facts on the complete Famco line.

FAMCO MACHINE COMPANY
1319 18th St. Racine, Wis.

Floor Type Arbor Press

No. 15 Foot Press

Famco builds 32 stock sizes of bench and floor model arbor Presses . . . ¾ to 15 tons pressure; and 10 sizes of Foot Presses, bench and stand mounted types.

famco FOOT AND ARBOR PRESSES

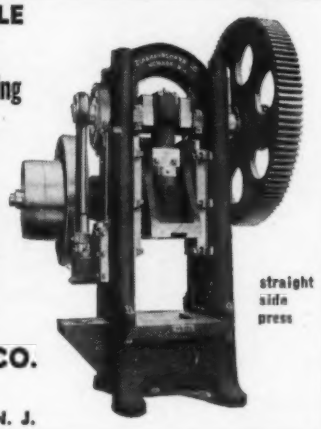
STRAIGHT SIDE SINGLE CRANK PRESSES

for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.



straight side press

ZEH & HAHNEMANN CO.

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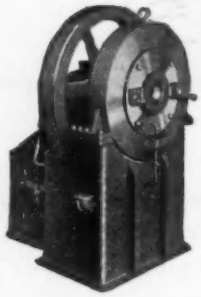

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TORRINGTON

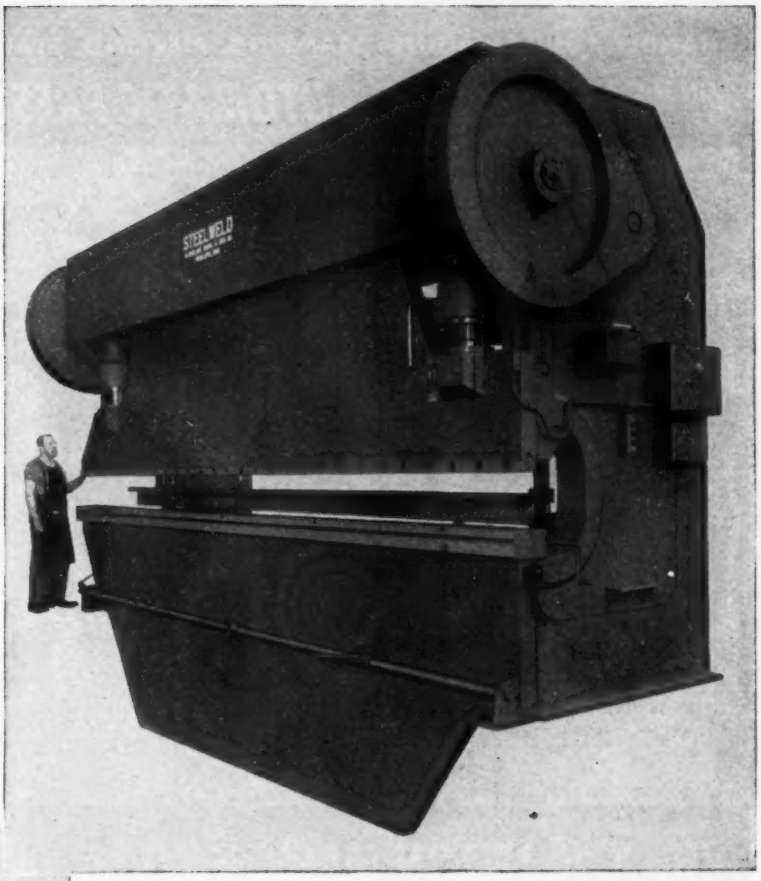
ROTARY SWAGING MACHINE

— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

The Torrington Co., Swager Dept.

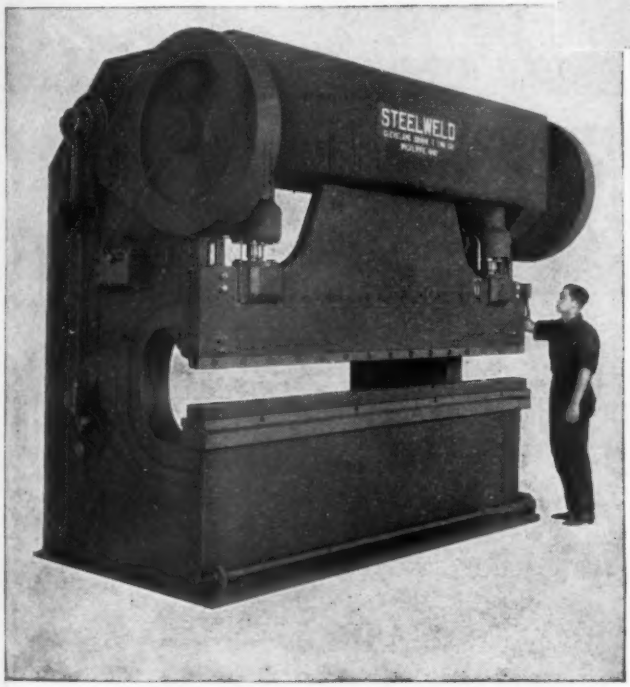
56 Field Street Torrington, Conn.

Easy Operating Versatile Presses



Model J4½-16. Length of bed and ram is 19'-0". Because of distance between housings, the bed is extended below floor to assure straight accurate bends.

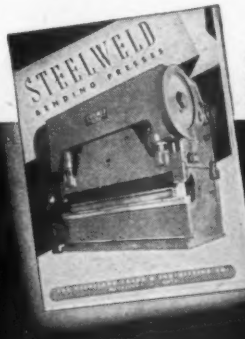
Model H-3½-8. Handles plate up to 10'-¼". Gauges and indicators provided, make it a simple matter to obtain identical results repeatedly, with a set of dies.



These bending presses are as easy operating as they are modern in apperance. They are versatile tools that are quickly adapted to various bending, corrugating, punching and forming operations.

The complete line of Cleveland Steelwelds is built to withstand heavy brunts to which presses are occasionally subjected. Every machine is generously designed throughout. Each has tremendous power, enabling the ram to carry through smoothly and easily. The husky brake-clutch mechanism stops the ram nearly instantly or permits it being jogged in minute amounts.

If you work with plate in any thickness up to one inch or length up to 20 feet, you too, like hundreds of present users, may find it possible to speed production, cut costs and enhance your product appearance with modern Cleveland Steelwelds.



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CATALOG No. 2002 gives complete construction and engineering details. Profusely illustrated

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STEELWELD PRESSES
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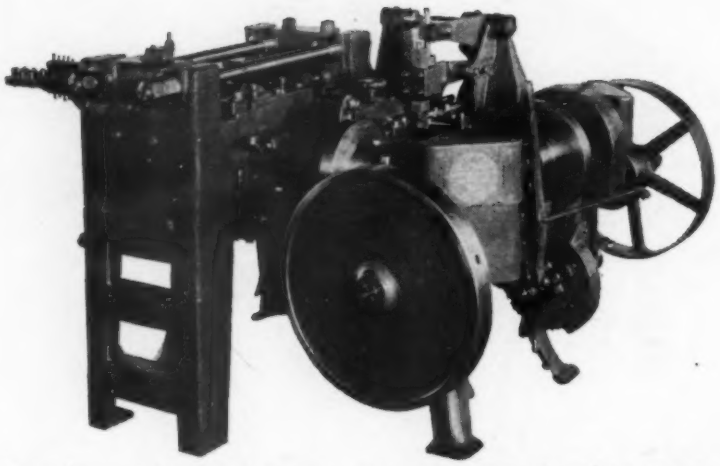
HANDLE YOUR SWAGING, STAMPING, PIERCING, BLANKING and FORMING of COILED METAL

ON THE **NEW NILSON AUTOMATIC PRESS and FOUR SLIDE MACHINES**



These Nilson machines are built in two sizes and are fully described in Bulletin No. 90, available promptly on request.

. . . for fast, heavy duty work

An outstanding feature of these combination power press and four slide machines is the powerful, silent action of the main press slide which is operated by crank motion through toggle or knuckle joints. Overhead stay rods contribute to the tremendous strength and rigidity of this machine.

Other features include simple and easy changing of accessible and removable die set, open construction of forming slides and tool adjustments made without interference.

•

Nilson's more than 30-year experience in the design, development and manufacture of special, high production automatic machinery is available to assist you in producing any special machines you may require. Consult our engineers and be assured of a comprehensive service.

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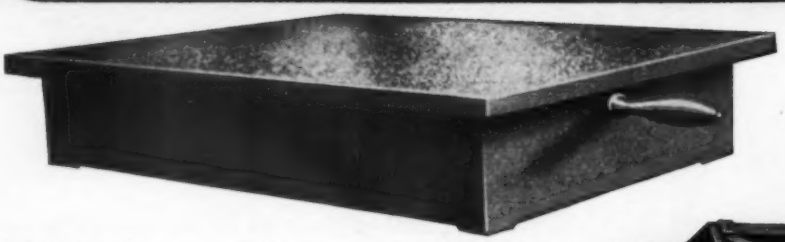


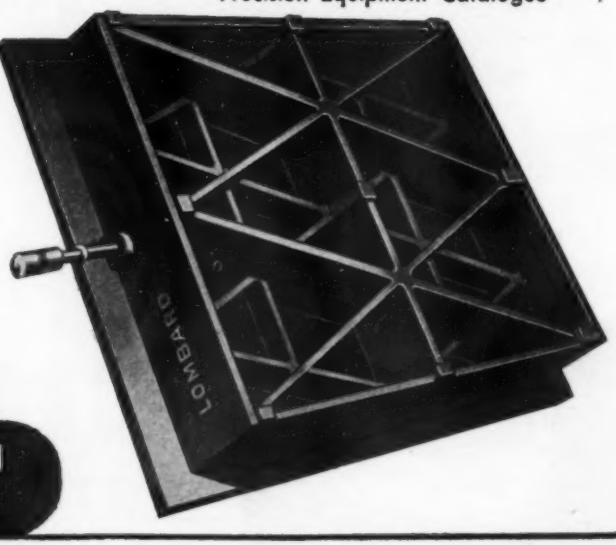
for Prompt Delivery!

For immediate delivery place your order now before stock items are exhausted. If possible give alternative size. Write Dept. 29 for latest Precision Equipment Catalogue

Representing the acme of vital precision inspection equipment, Lombard Master Style Surface Plates are now available from stock. With their scientifically designed ribbing, three point suspension and extremely rugged construction, these master accurate surface plates are carefully heat treated and hand scraped to extremely close tolerance. Commercial style surface plates are also available. These plates although of a different basic design are now being universally used for general inspection and shop use.

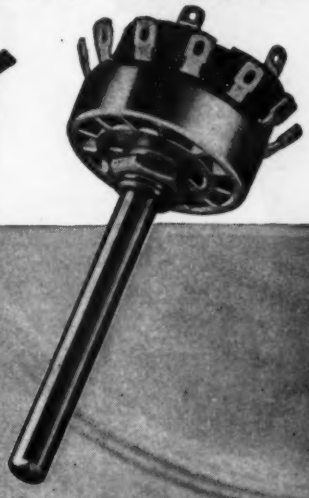
	Sizes	Types A	B	C
The Master Style	14"x18" to 48"x96"	.0001	.0003-4	.0005-.001
The Commercial Style	8"x12" to 48"x96"	.0002-3	.0005-.001	

Planer finish also available in both styles. All plates are furnished with lifting handles and finished wooden covers.



LOMBARD GOVERNOR CORPORATION
500 MAIN ST. ASHLAND, MASS. U. S. A.

FEDERAL PRESSES SPEED EARS FOR THE ARMY

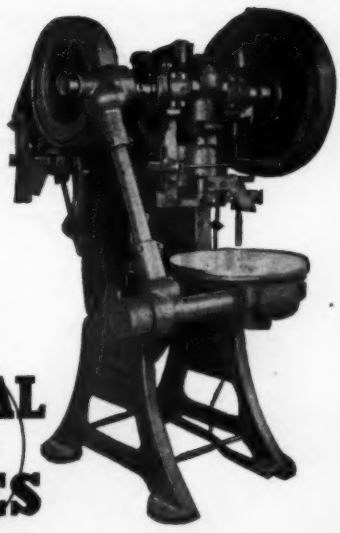


ROTARY switches, used extensively in the radios of our armed forces, are speeded to completion at P. R. Mallory and Co., with the help of Federal Presses. By staking the terminals of a switch section on a 12-station Federal Dial Feed Press, assembly time is reduced substantially, and a possible bottleneck is avoided.

Federal Presses are performing many highly specialized jobs in hundreds of plants throughout America to speed sorely needed war equipment. Primary, secondary, and assembly operations are accomplished quickly, safely, and precisely, often eliminating the need for specialized machinery of limited utility. Write for help with your press problems.

Special Applications

Federal Open-Back, Inclinable Presses may be equipped with automatic feed and ejector mechanisms, and automatic stops. Standard models of either geared or flywheel type are available in 9 sizes with capacities from 6 to 80 tons, with or without dial feeds.



FEDERAL DIAL FEED PRESSES

THE FEDERAL PRESS CO., 311 DIVISION STREET, ELKHART, INDIANA

IN THE SPOTLIGHT

Occupying a prominent place on the production line of American Industries is the standard type AVEY Drilling Machine. Sturdily built to give longer operating hours, smoother performance and lower maintenance. A wise investment because it does your war job now—your peace job later, with no time out for conversion.

This AVEY Drilling Machine, Type MA-6, is now being built in No. 2 size (capacity in cast iron, 7/8"). No. 3 size (capacity in cast iron, 1¼"). One to six spindle units, either size. Six speed machine, two speed motor with three mechanical changes through gearing. Speed range is eight to one. Push button control. The above photograph shows the MA-6 equipped with three spindles, the Aveymatic Feed, Hand Feed and Tapper.

AVEY DRILLING MACHINE CO.
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A Mighty Interesting Book—Tells about the finest Band Saws made and their uses on many special test jobs. Well illustrated and worth seeing. Write for copy today.

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Below are given the number of lineal inches of six staples ¼" thick that can be cut per minute when these better saws are used at the specified speeds:

TOOL STEEL	4½ to 10 Lineal Inches
COLD ROLLED STEEL	9 to 12 Lineal Inches
HIGH CARBON STEEL	3½ to 10 Lineal Inches
CAST IRON	16 Lineal Inches
ARMOR PLATE	8 to 10 Lineal Inches
STAINLESS STEEL	3 to 5 Lineal Inches

DoALL Band Saw users are given a real aid, the DoALL Job Selector Dial, which shows instantly the proper saw and speed for more than 150 materials.

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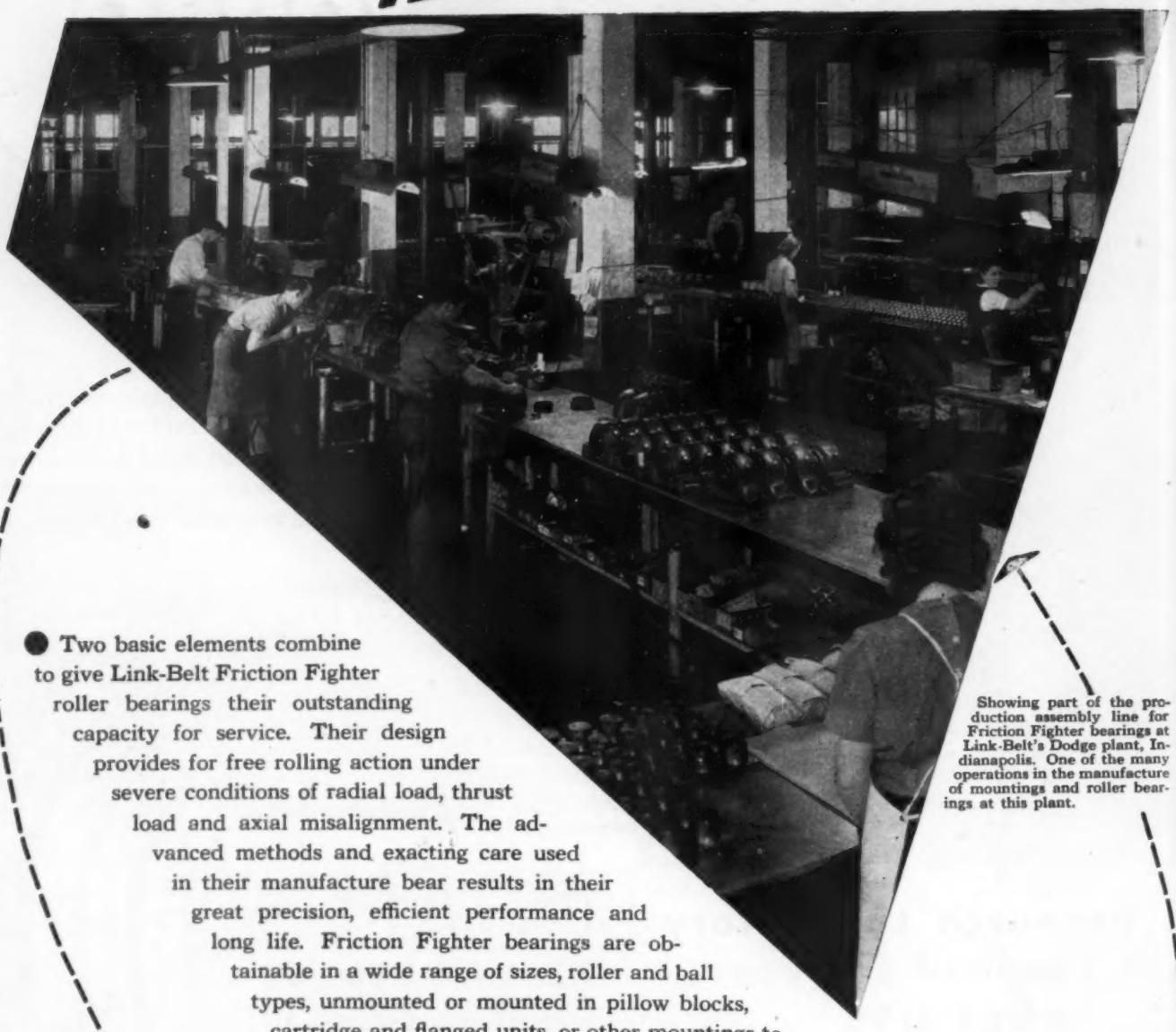
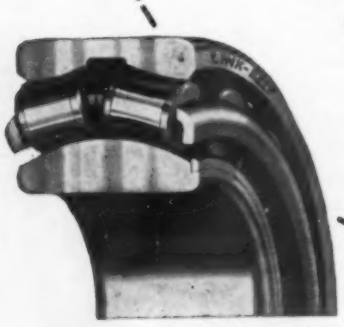
UNIQUE DESIGN *Plus* PRECISION MANUFACTURE



Showing part of the production assembly line for Friction Fighter bearings at Link-Belt's Dodge plant, Indianapolis. One of the many operations in the manufacture of mountings and roller bearings at this plant.

● Two basic elements combine to give Link-Belt Friction Fighter roller bearings their outstanding capacity for service. Their design provides for free rolling action under severe conditions of radial load, thrust load and axial misalignment. The advanced methods and exacting care used in their manufacture bear results in their great precision, efficient performance and long life. Friction Fighter bearings are obtainable in a wide range of sizes, roller and ball types, unmounted or mounted in pillow blocks, cartridge and flanged units, or other mountings to suit all conditions of service. Complete description and full engineering data are contained in Book 1775. Write for a copy today. Link-Belt Company, Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Dallas 1, San Francisco 24, Toronto 8. Offices, warehouses and distributors in principal cities.

9291



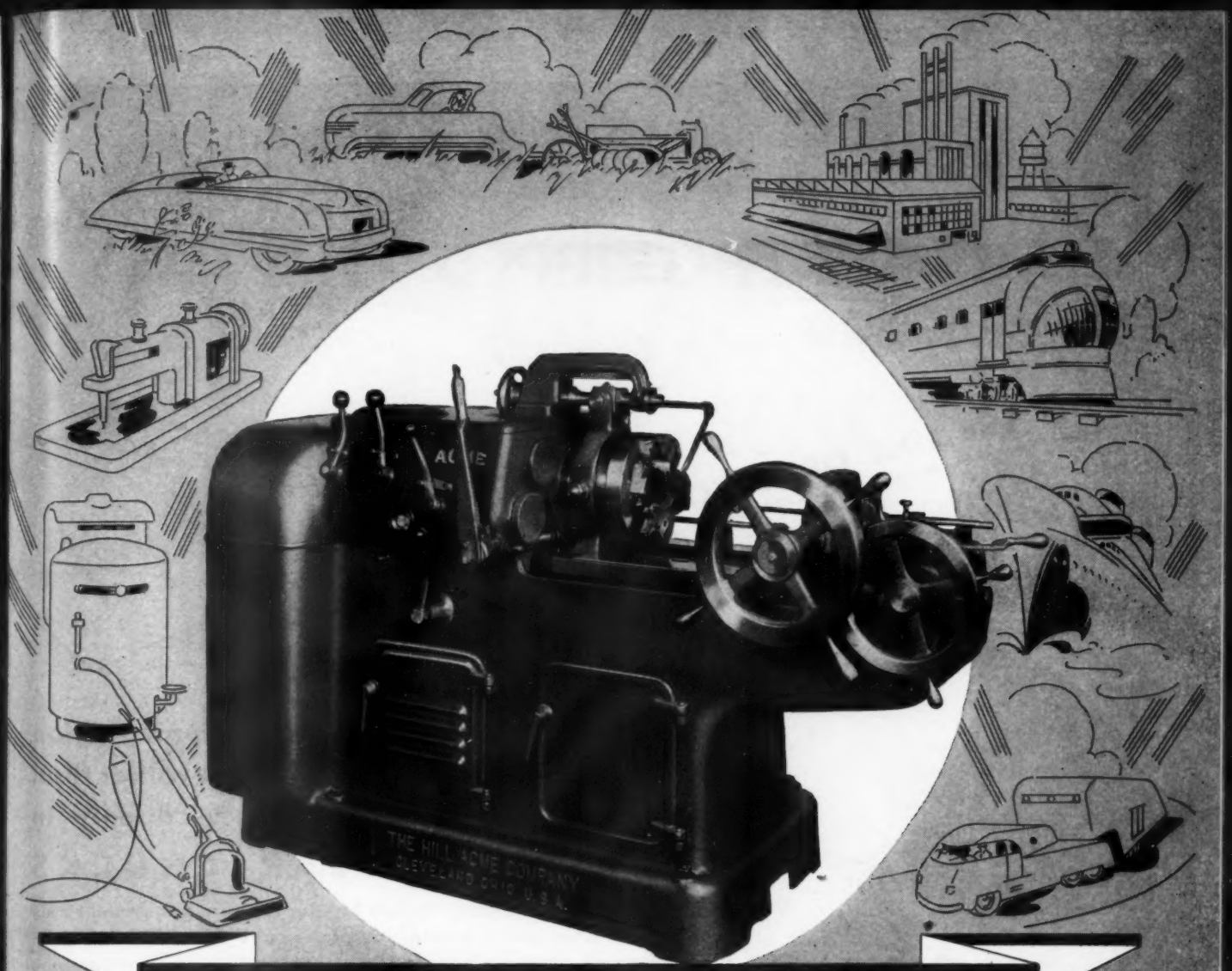
Friction Fighter Series "DE" roller bearings, illustrated, are self-contained and are properly adjusted at the factory, requiring no further adjustment at installation. Their inherent self-aligning and pre-adjustment features make it unnecessary to resort to the use of undesirable, expensive, or cumbersome self-aligning housings. The "self-contained" feature also permits the bearing to be floated axially in the housing to compensate for shaft expansion.

LINK-BELT

FRICTION FIGHTER

BEARINGS

Roller and Ball Types



THIS machine has a FUTURE

THIS MACHINE is no "war baby." Happily, its designing was completed and it was in full production in time to help win this war . . . and it is doing its full part with no holds barred and no favors asked. But this ACME Model XL Threading Machine has a *future*—a future based on the needs of an America that will replace all the millions of manufactured articles from railroad cars to radios that are being worn out today. . . . The owner of this Model XL Threading Machine also has a future for he is properly equipped to compete in the highly competitive market which total victory will bring.

BULLETIN 1143 GIVES COMPLETE DETAILS—Send for it.

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Established 1902

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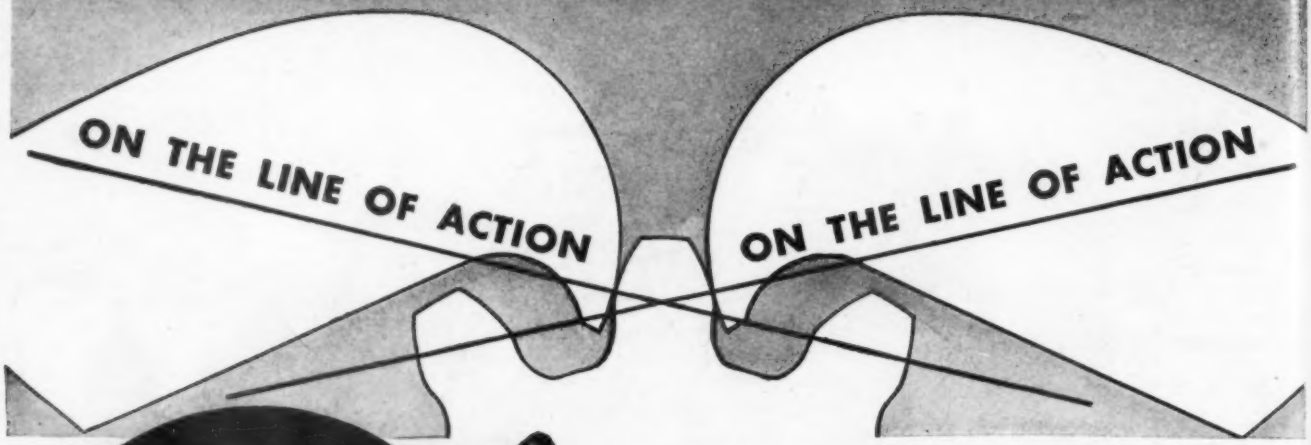
Cleveland, Ohio

To Hold Gears *with precision*

FOR BORING OR GRINDING

HAVE TEETH GRIPPED THIS WAY



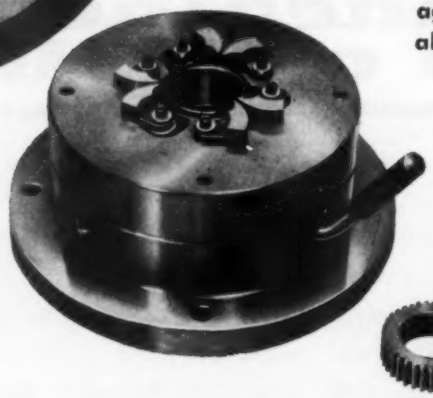
Method eliminates distortion. Gripping action distributed around circumference rather than through diameter. Principle used only in

MATCH-IT GEAR CHUCKS

For grinding the hole, the hub face, or for boring most delicately constructed gears within your tolerances in relation to pitch diameter. Distance from root diameter to the hole or counterbore of any gear never presents a problem, as pressure is always against the sides of teeth, never toward the center along diameter to cause distortion.

MATCH-IT GEAR CHUCKS are made for internal and external gears, spur and helical gears, and countershaft type gears.

All your gears can have perfect, round holes. If your production gives you too many scrapped gears, perhaps your chucking can be improved. Our engineers can help you deliver a higher percentage of perfect gears.



We believe no other chuck will produce as accurate results.

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BROACHED
Rapidly and Economically

Heat treat distortion in hardened gears is corrected by broaching with RED RING Naloy Broaches. In fact, RED RING engineers have pioneered in this field.

Naloy is a very tough, hard alloy developed especially for broaches and form tools. It shows a useful service life 150-200 per cent longer than other steels usually used for broaches and it is particularly effective in tough forgings and castings.

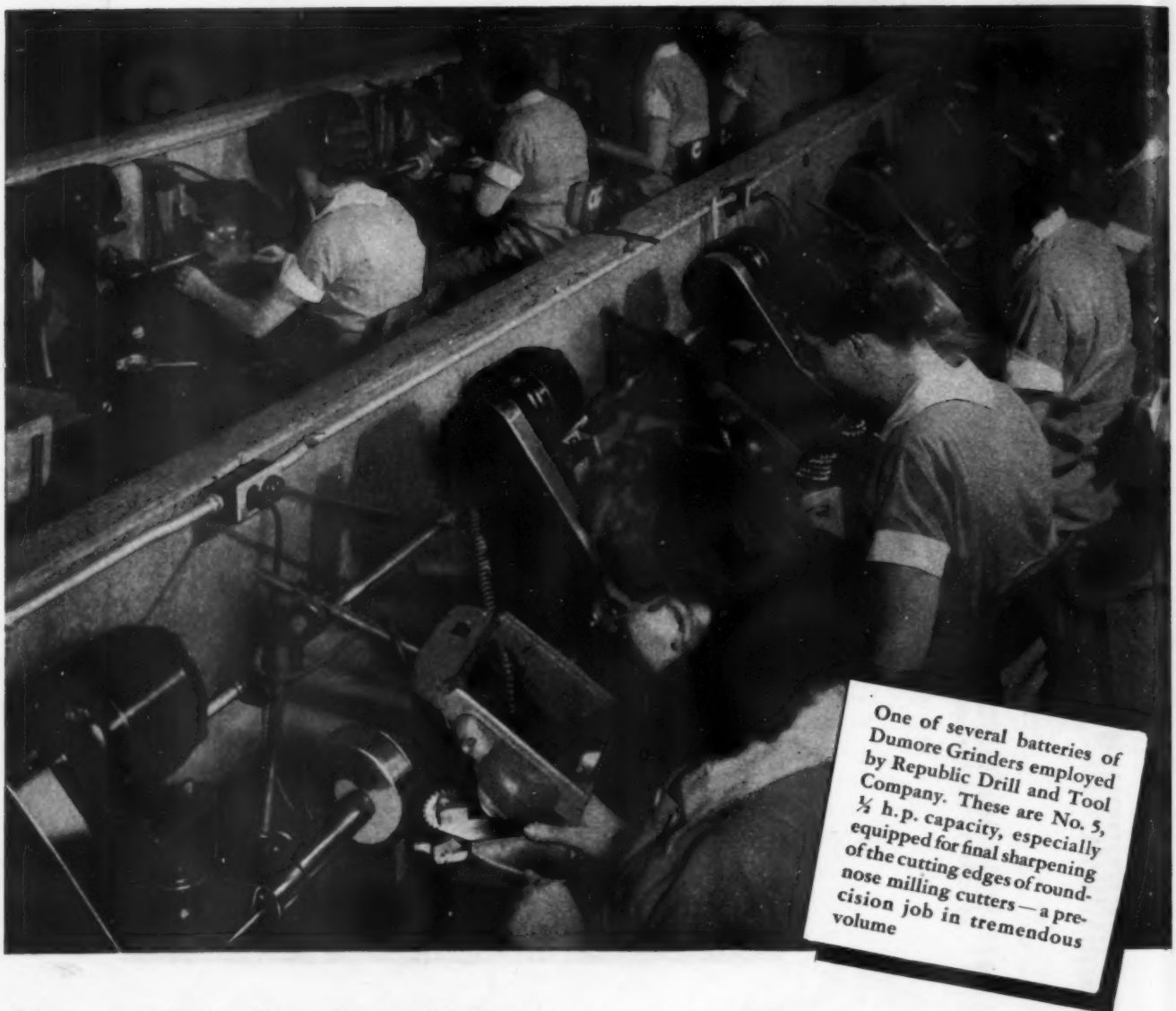
Write RED RING engineers for special advice on broaching operations and send for the descriptive bulletin on Broaches.

NATIONAL BROACH AND MACHINE CO.
RED RING PRODUCTS
5600 ST. JEAN · DETROIT, MICH.

SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

EXPAND GRINDING FACILITIES *at Low Cost*



One of several batteries of Dumore Grinders employed by Republic Drill and Tool Company. These are No. 5, ½ h.p. capacity, especially equipped for final sharpening of the cutting edges of round-nose milling cutters—a precision job in tremendous volume

Dumore Grinders Speed Cutter Production at Republic!

Another striking example of their ready adaptability, this battery of Dumore precision grinders provides a huge volume of production at minimum investment. Special equipment consists of a face plate mounted under each grinder, and fixtures and gages for each size of cutter. Tolerances of .0005 are maintained with ease.

All the essentials of precision and durability are provided in the Dumore. Provided with a suitable base it becomes a production grinder with wide range of application.

For complete details, ask for Catalog 42.

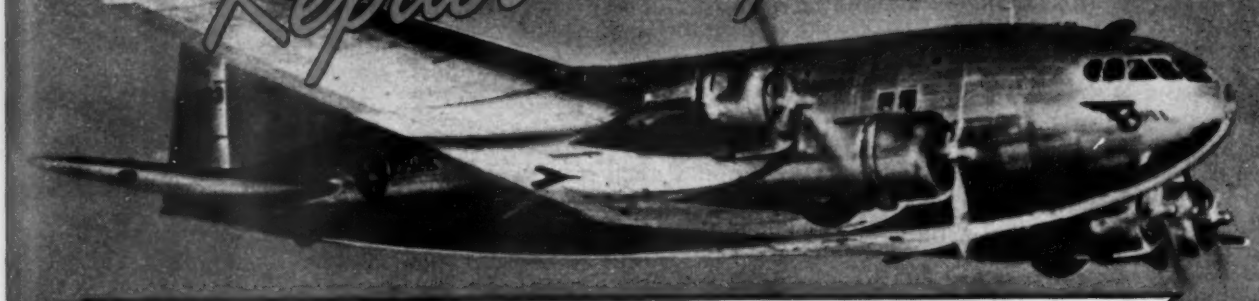
THE DUMORE COMPANY · GRINDER DIVISION · Rracine, WISCONSIN

Dumore

PRECISION GRINDERS

DUMORE PRECISION GRINDERS ARE SOLD BY AUTHORIZED DISTRIBUTORS IN ALL PRINCIPAL CITIES

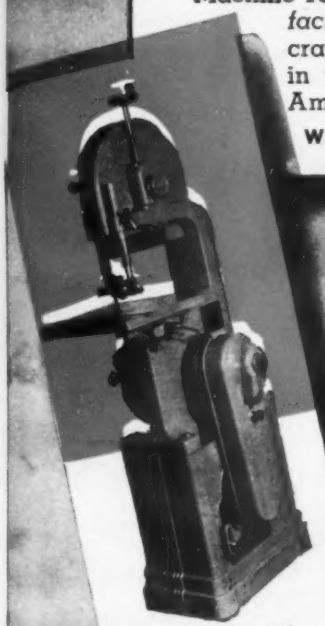
In Pan-American Repair Shops, it's..



WALKER-TURNER *Machine Tools*

Many thousands of Walker-Turner Drill Presses, Metal Cut-Off Machines, Radial Drills, Band Saws and other Machine Tools are used in the *manufacture* of aircraft. But in aircraft *maintenance*, also, as in the repair shops of Pan American World Airways System, the extraordinary versatility of these units is clearly demonstrated. Their exceptionally wide range of operating speeds enables them to cut all kinds of materials—an important consideration in handling the varied jobs that come to repair shops. Send for catalog.

WALKER-TURNER COMPANY, INC., 4440 Berckman St., Plainfield, N. J.



BAND SAW

14 in. and 16 in. models. Back gearing and cone pulleys provide speed range from 61 to 5300 s.f.m. for cutting practically any material from steel to wood.

20-INCH DRILL PRESS

Power or hand feed. Drills to center of 20" circle. Feed 6". Capacity 1" in cast iron, ¾" in steel. Spindle speeds 260-5200 r.p.m.

Handles light drilling, tapping and routing operations as effectively as larger machines. Drills to center of 62" circle. Max. distance nose of chuck to table, 13½". Spindle traverse, 8½".

walker-Turner COMPANY, INC. PLAINFIELD, N.J. U.S.A.

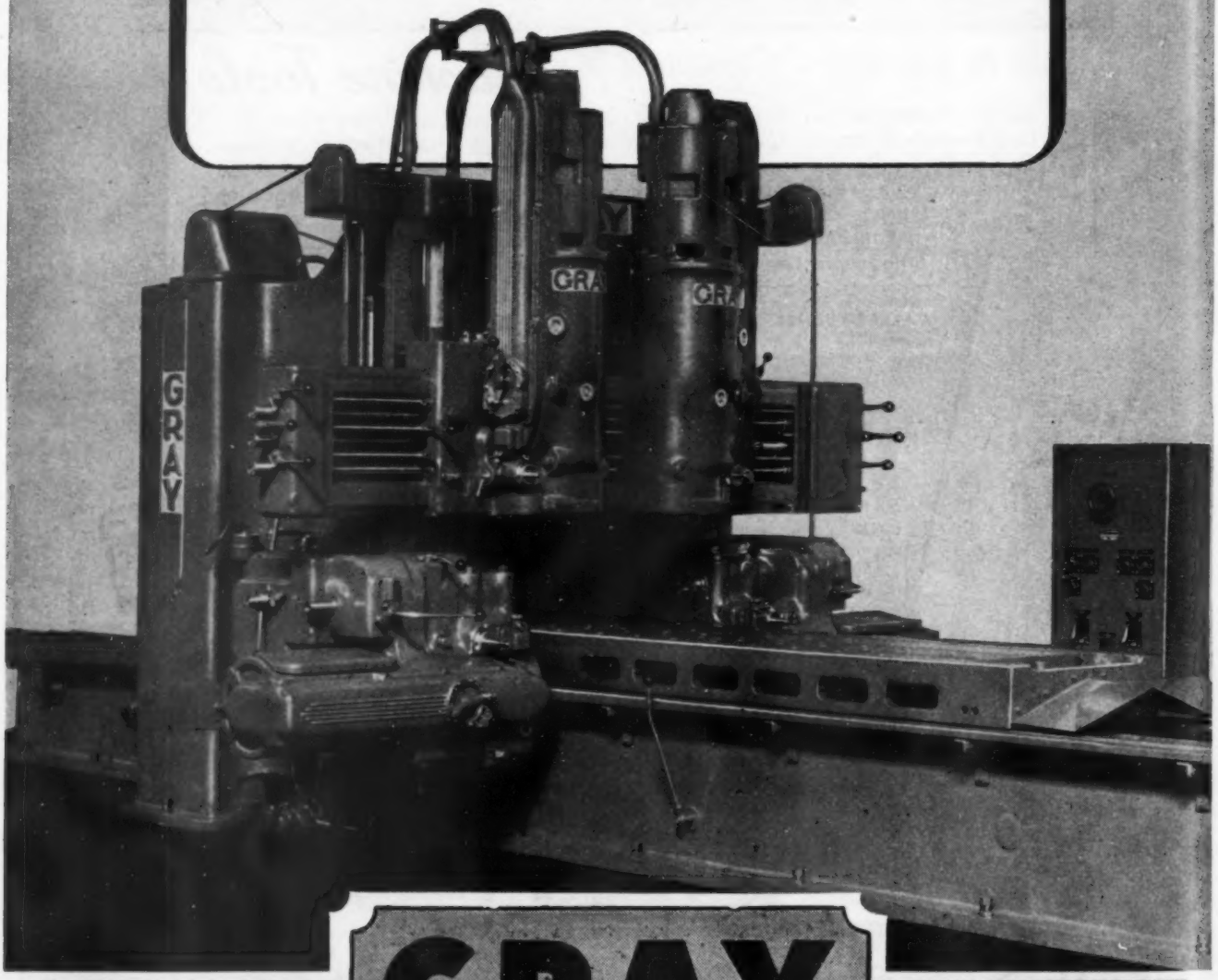
MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

FLEXIBILTY!

● The nature of your work may change radically within the next six months or a year. To meet this possibility, farsighted executives are buying machine tools that combine flexibility with high productive capacity. The Gray Planer Type Milling Machine is such a tool.

You can work on five sides of a job without resetting. The unit head design permits running each spindle at the most productive speed. Speed range from 10 to 500 r.p.m. Feed of heads and table from ½" to 30" per minute.



THE G. A. GRAY COMPANY
Cincinnati Ohio, U.S.A.

THE GRAY LINE — Double Housing and Openside Planers, Switch Planers, Die Block Planers, Double-Housing and Openside Milling Planers, Planer Type Milling Machines, Horizontal Boring Machines.

Reciprocating Hy-Draulic Machine Tools

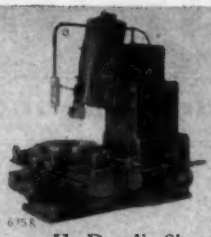
Give You Maximum Cutting

One of the outstanding advantages in Hy-Draulic Machine Tools is constant cutting pressure steadily maintained at uniform speed throughout each chip. There is no gradual acceleration and deceleration of cutting speed, no fluctuation of cutting pressure. Forward movement increases so rapidly after reversal that full speed is reached when tool starts to cut. Speed then remains constant at selected rate . . . and this can be any rate whatever in specified range of machine. Cutting pressure is applied in a straight line parallel and close to ram or table, is uniform throughout each cut. Reversals are quick and cushioned, return ratios higher than in mechanical drives. This adds up to maximum cutting efficiency in Hy-Draulic Machine Tools.

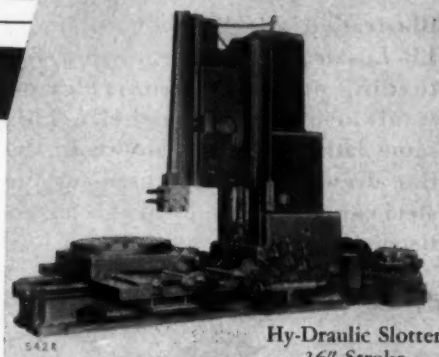
Special Uses: In addition to maximum cutting efficiency, and other advantages, Hy-Draulic Machine Tools have many special uses in machining weldments, forgings, castings, die blocks and other work pieces. Our wide experience in the application of Hy-Draulic Machine Tools is yours for Victory. Send drawings and complete data for quotations on special machines. On standard machines, write for Catalog Number 1103.

BUY UNITED STATES WAR BONDS AND STAMPS

4321

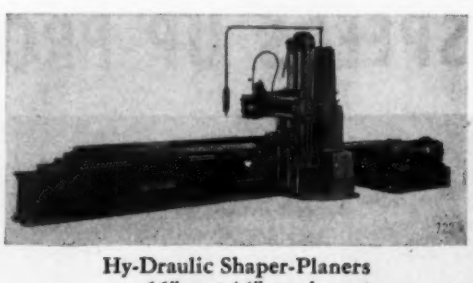


Hy-Draulic Slotter
12″ Stroke

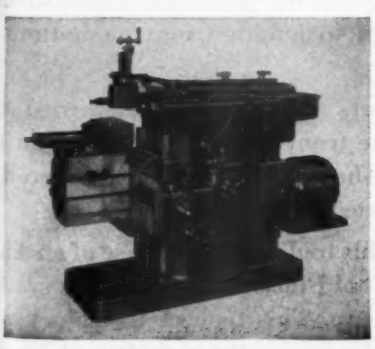


Hy-Draulic Slotter
36″ Stroke

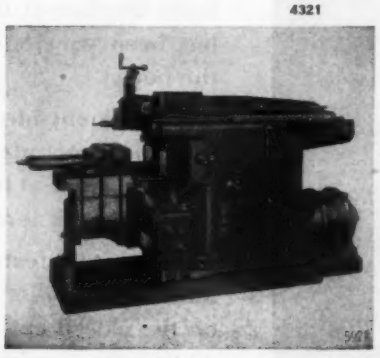
Hy-Draulic Planers
Double-Housing shown, Openside available



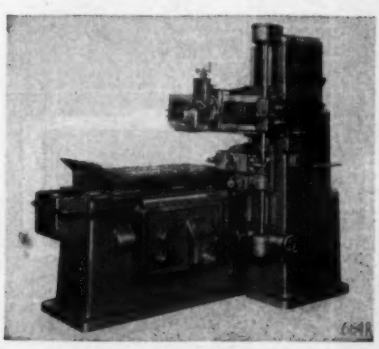
Hy-Draulic Shaper-Planers
66″ to 144″ stroke



Hy-Draulic Shaper
12″ High Speed



Hy-Draulic Shapers
16″ to 28″ stroke



Hy-Draulic Shaper
36″ Openside

Hy-Draulic
Reg. U. S. Pat. Off.

Shapers . . Planers . . Slotters . . Shaper-Planers

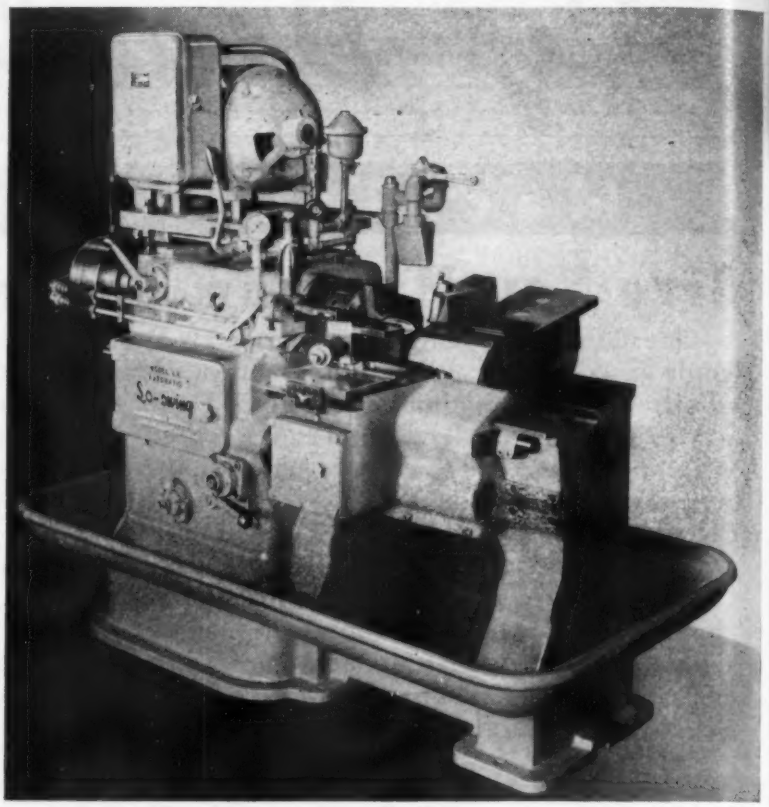
ROCKFORD MACHINE TOOL CO.

ROCKFORD, ILLINOIS, U.S.A.

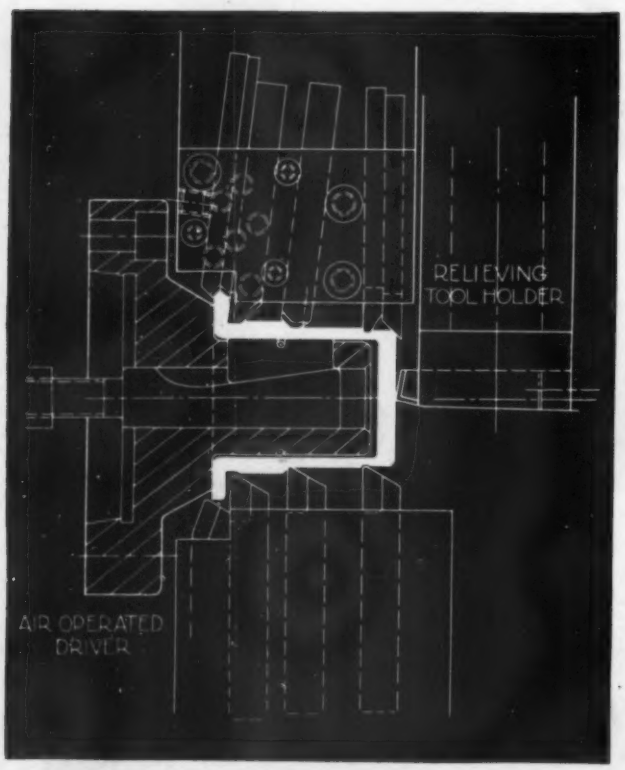
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. **"THE *Lo-swing* PEOPLE"** SENECA FALLS, NEW YORK

Illustration at right shows a Model LR *Lo-swing* Lathe equipped for turning points and bourrelet on small armor piercing shells. This same lathe, tooled as shown in the line drawing below, is used for the steel cup job described in this advertisement.



MODEL LR AUTOMATIC *Lo-swing* LATHE SPEEDS UP PRODUCTION ON CHUCK WORK



Problem: To automatically turn, face and undercut steel cups made from forgings.

Solution: The Model LR Automatic *Lo-swing* Lathe was selected for this job. The cups are held and driven on an air-operated, three jaw expanding arbor. The piece is located from the face of the flange on the open end, which surface has been previously faced to length from the bottom of the bore.

The three outside diameters and the flange are turned with four tools mounted on the front carriage, as shown in the tooling layout at left. All shoulders are faced, chamfered or undercut with tools mounted on the rear slide.

An important feature of this tool setup is the use of an Automatic Tool Relief Type Tool Block for the facing operation on the closed end of the cup. This type of tool block prevents "spiral scoring" of the face as the carbide tool is automatically relieved on the return stroke. Sintered carbide tools are used throughout for this turning operation.

Since the Model LR *Lo-swing* Lathe is completely automatic, it may be operated by unskilled operators who merely load and unload the parts and push the starting lever.

LATHE NEWS from SENECA FALLS

FIVE SIZES

(18" to 36")

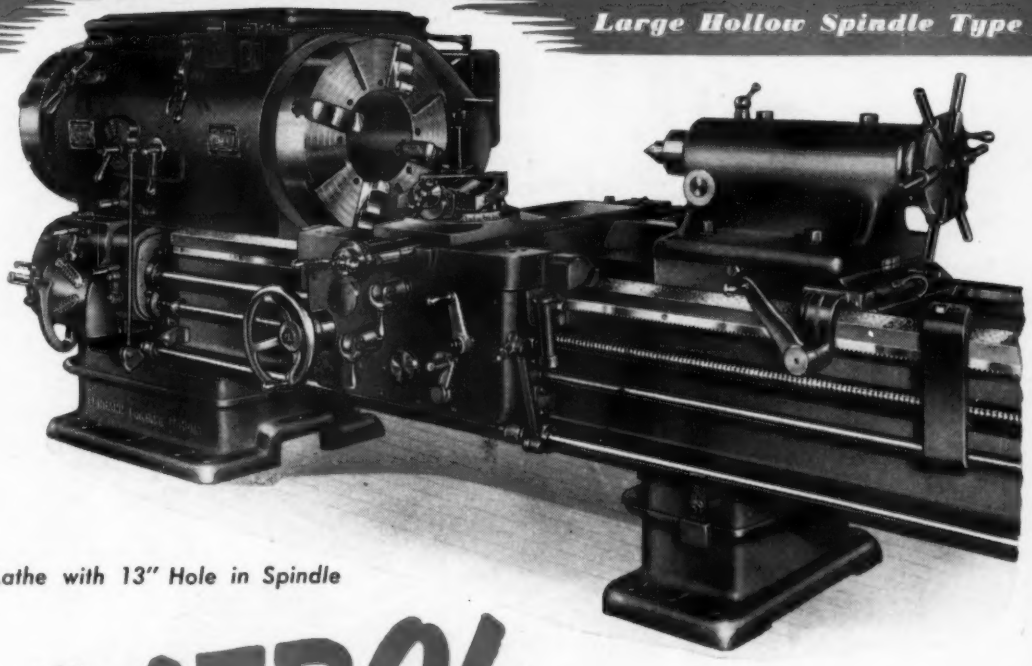
PROVIDE WIDE RANGE OF USEFULNESS & EFFICIENCY!

Large Hollow Spindle Type

SMALL
18"—Up to 7¼" Hole

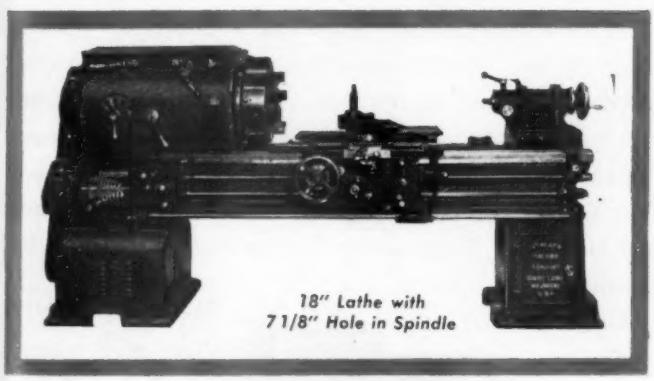
MEDIUM
24"—Up to 12" Hole

LARGE
27"—Up to 13" Hole
30"—Up to 14" Hole
36"—Up to 16½" Hole



30" Heavy Duty Lathe with 13" Hole in Spindle

HYDRATROL LATHES



18" Lathe with 7 1/8" Hole in Spindle

8 Distinctive Features

- ★ Easy, Fast, Simple Operation.
- ★ Hydraulic Brakes and Clutches.
- ★ Absence of Mechanical Troubles.
- ★ Essential Operating Information Automatically Presented (on all Standard Models).
- ★ Automatic and Ample Lubrication.
- ★ Mechanism Protected by Automatic Control.
- ★ Extraordinary Hardness of Bed.
- ★ Available with Large Turrets for carriage which fully utilize the Great Power Capacity of these machines; and Beds on both ends of Headstock.

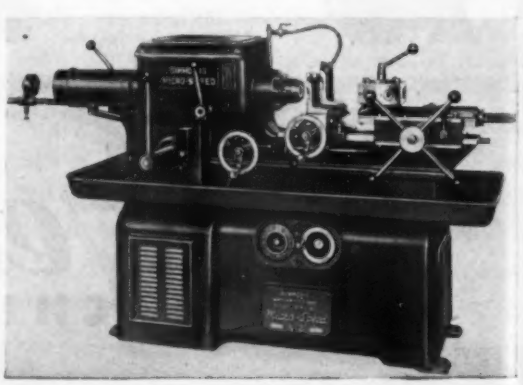
Lehmann
MACHINE COMPANY

CHOUTEAU AT GRAND ★ SAINT LOUIS (3) MISSOURI

For War or Peace... A DEPENDABLE TURRET LATHE

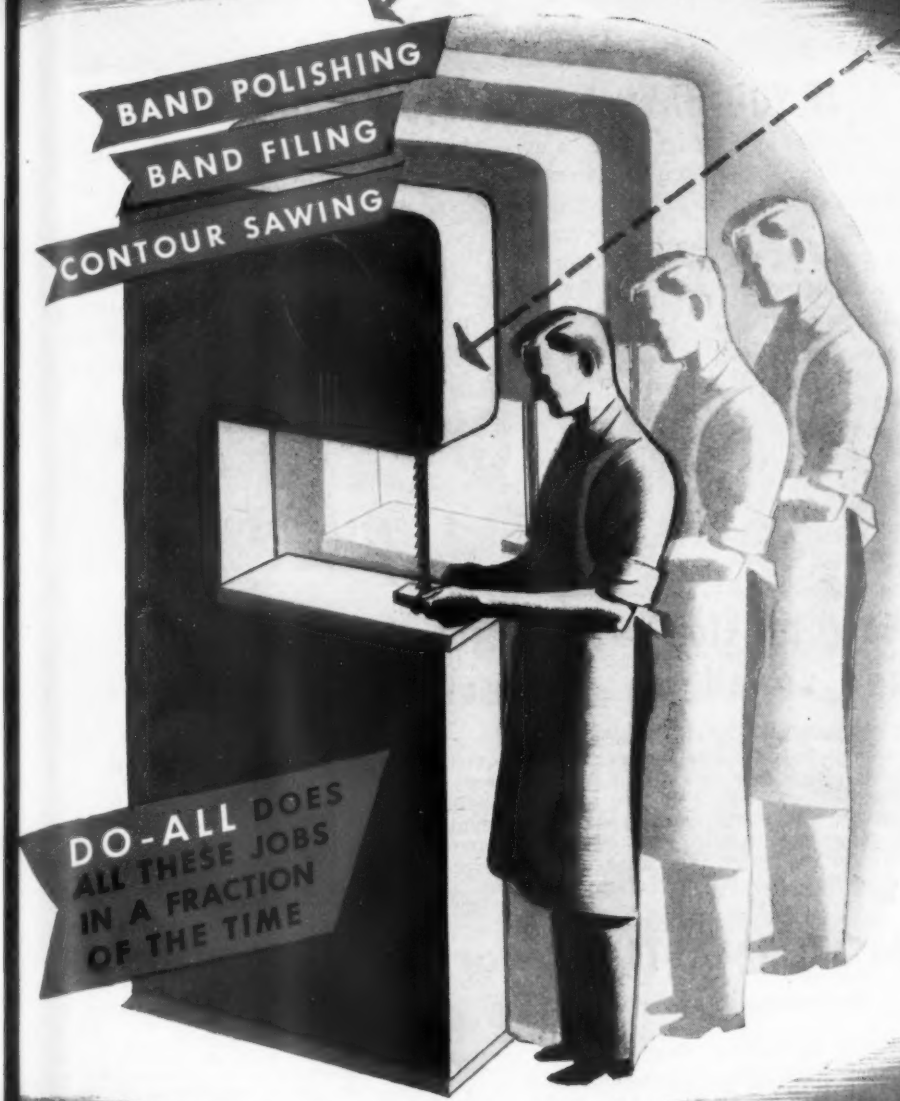
Simmons No. 2 Turret Lathe, Drawn by Lili Rethi

★ "Enthusiastic" is the word that best fits the reception given to the Simmons No. 2 Turret Lathe—both in volume of sales and satisfaction—since it was first placed on the market several years ago. ★ Here's the reason: Simmons set out to manufacture a precision turret lathe *low in cost, sturdy and simple to operate.* In its construction many "gadgets" and devices have been eliminated that might be required only on rare operations, complicate the instruction of new operators, and require unnecessary service attention. ★ How well these objectives have been attained can be determined by the enthusiastic comments received from the hundreds of satisfied users, among them Bendix Radio Corporation, Cessna Aircraft Company, Fairchild Aircraft, Ltd., Sterling Engine Company, Swift Lubricator Company, Dominion Engineering Corporation, Ltd. ★ Why not investigate for yourself the merits of this unusual machine tool. It has 1¼" bar capacity, 14" swing, Micro-Speed Drive with a range of 1,000 spindle speeds, Timken Bearings, spindle brake and clutch. Simmons Machine Tool Corporation, 1759 North Broadway, Albany 1, New York.



Simmons-Built MACHINE TOOLS

DO-ALL 3 MACHINES IN 1

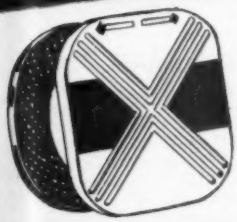


SAWS. Cuts shapes in metals, alloys, plastics, plymetals, etc. Does internal or external cutting — follows any design, straight or curved line, through thick or thin sections, with no waste excepting a very fine kerf dust.

FILES. Replace the band saw with a DO-ALL Band File and you're all set for rapid, clean filing that will amaze even experts.

POLISHES. The same machine accommodates DO-ALL Polishing Bands that put a fine finish on any product in double-quick time.

Every shop needs contour sawing and with it band filing and polishing — all possible with these new, time-saving machine tools. Six models priced from $1,000 to $5,000 with motors.



DO-ALL BAND SAWS
100 feet in a special metal Strip-out Container marked with size and style of contents.

DO-ALL BAND FILES
Available in different lengths to fit the model DO-ALL you own. Each in compact box.

DO-ALL POLISHING BANDS
Lengths to fit any DO-ALL Contour Machine. Available in three grits, 50, 80 and 150.

CONTINENTAL MACHINES, Inc.

1310 S. Washington Ave., Minneapolis 4, Minn.

DO-ALL Offices in 25 cities, with a staff of trained engineers to give you quick service on Contour Machines, Band Saws and Files, Gage Blocks and Surface Grinders

WOULD YOU LIKE A CONTOUR SAWING BOOK?

Send for a copy of this 265-page book of illustrated short cuts to faster and better machining. It's free.

ask Westinghouse!

...the one best way to find the one best motor for the job

Chances are that out of the many motors we're now making for battle service, we've got one to fit your needs. If not—Westinghouse is ready to design a new one or to adapt an existing type to fit your job . . . *and do it without false starts or lost motion*. Our experience in matching motors to battle jobs is at your disposal. Call or write your nearest Westinghouse office. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N. J-21290

Westinghouse
MOTORS AND CONTROL

IF YOU HAVE A VIBRATION PROBLEM . . .

Originally developed for use in aviation, where loose fastenings can not be permitted in spite of severest vibration, Boots Self-Locking Nuts provide a simple solution *wherever* there is a fastening problem. Boots Nuts *can't* work loose.

One-piece, all metal, Boots have these important advantages over other nuts:

1. Greater re-usability in maintenance.
2. Proof against corrosive action of oil, water, or chemicals.
3. Resistance to high temperature.

Boots Nuts meet exacting specifications of all government aviation agencies.

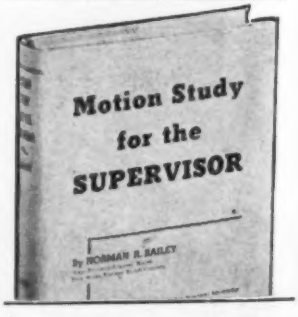
There's a BOOTS NUT for every application

ROL-TOP **BOOTS** ANCHOR

BOOTS AIRCRAFT NUT CORPORATION
GENERAL OFFICES, NEW CANAAN, CONNECTICUT

How to stop waste motion and speed up production

This book gives a simplified, practical method of motion study for analyzing operations quickly and easily, enabling the foreman to employ motion study as a useful, everyday tool in speeding production and increasing output in his department. It shows how to detect wasted effort in operations, how to recognize the cause of ineffective work, and how to develop better job methods.



MOTION STUDY for the SUPERVISOR

By Norman R. Bailey

Wage Standards Engineer, Kodak Park Works, Eastman Kodak Co.

Price only $1.25

Now the foreman or supervisor may use motion study as easily as any everyday management process. With only a stop-watch and a simple, basic "formula", he can analyze any operation for improvement. Even operations to which it formerly was unprofitable to apply motion study may be analyzed by the simplified methods explained in this book. Here is a practical means of eliminating ineffective work and of spotting opportunities for methods improvement, with worthwhile cumulative benefits in greater production per hour.

Shows you:

- —how to break down any operation into only 5 "work elements" common to all operations
- —how to time an operation
- —how to identify useful or wasted effort
- —how to reduce repetitive motions by simple changes in layout and planning
- —when to use simple fixtures for eliminating wasted effort
- —how to train the operator in new methods

EXAMINATION COUPON

McGraw-Hill Book Co., 330 W. 42nd St., N. Y. C.

Send me Bailey's Motion Study for the Supervisor, for 10 days' examination on approval. In 10 days I will send $1.25, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

Name .....

Address .....

City and State .....

Position .....

Company .....

F. A. 11-11-43

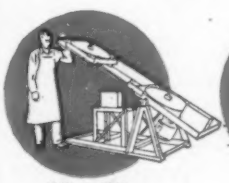
Save time on metal cutting

IN PRODUCTION STORES TOOLROOM MAINTENANCE

WELLS No. 8
Capacity
8"x16"...Rectanglar
8" diameter...Round

. . . with a WELLS No. 8 metal cutting band saw

No. 5



No. 20

V-12

STOCK STANDS

THE Wells No. 8 is an all-purpose metal cutting saw, fast for a saw of its size. It can be used on production, in stores, toolroom, or on maintenance to cut most metals in most shapes. Easily portable, it can be moved to the job.

The Wells No. 8 cuts fast because it cuts continuously. Quick acting swivel vise affords rapid set-up and change-over . . . Gravity feed and automatic motor shut-off permits one operator to run 2 to 4 Wells Band Saws simultaneously . . . Three speeds, insure efficient cutting.

Ruggedly constructed, with a minimum of moving parts, Wells No. 8 offers a long life of trouble-free service.

You will find a Wells saw to suit nearly every application. Ask your Mill Supply dealer to give you a demonstration. Quick deliveries are assured.

Write for Your Copy of the New Wells Catalog

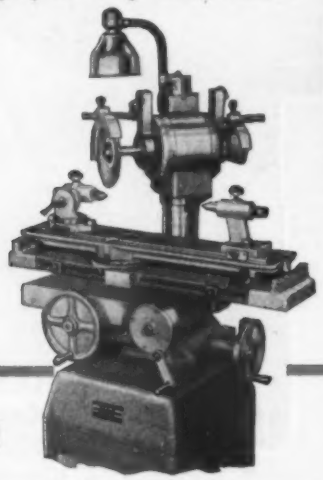
WELLS MANUFACTURING CORPORATION

Wells METAL CUTTING BAND SAWS

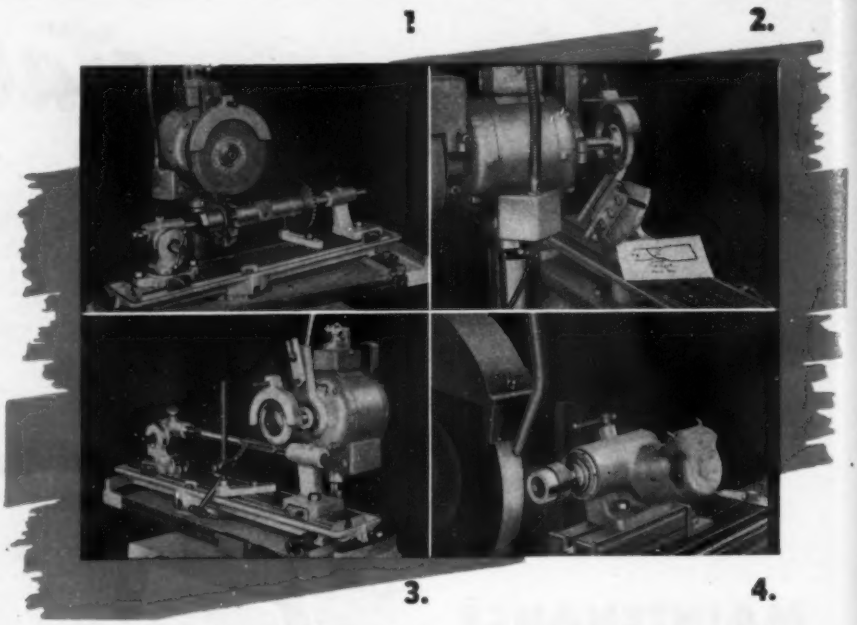
505 ROOSEVELT ROAD • THREE RIVERS, MICHIGAN

THE NEW *Knock-Out* UNIVERSAL TOOL GRINDER

Production or Maintenance — it will pay its way many times



Model B600



1. Grinding alternate tooth cutter
2. Pre-determined form grinding
3. Grinding inside flutes of taps
4. Motor Driven Work Head on production

New, Illustrated Literature just off the press.

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Write for Bulletin UTG-43-AM.

KNOCK-OUT KO

K. O. LEE COMPANY

ABERDEEN SOUTH DAKOTA

HOLDS 3 BIT SIZES IN 4 POSITIONS

Every AMERICAN TOOL HOLDER Has this and other advantages

American Tool Holders are made in four sizes to cover a wide range of tool room requirements. *Every one* will hold *three* sizes in *four* positions. A single bolt holds the tool *immovably* in any one of the four positions. Short bits are held as rigidly as long bits because of the wide gripping action. *On precision tool room lathe work specify American Tool Holders.*

MAIL THE COUPON TODAY

COUPON

Please send complete information on the four standard sizes of American Tool Holders.

NAME..... TITLE.....

COMPANY .....

STREET .....

CITY..... STATE.....

A.M.

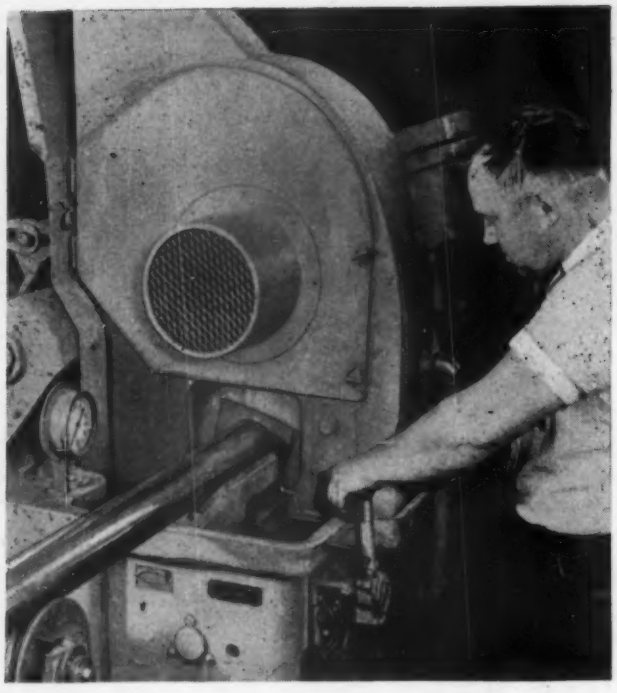
EDWARD BLAKE COMPANY

234 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

BLAKE TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS — I & D HIGH SPEED DRILL PRESSES

Compact in design—sturdily constructed—foolproof in operation—this powerful DeWalt will *speed up* your cut-off operations not only in today's emergency but long after the war is over. Write for descriptive literature.

DE WALT
PRODUCTS CORPORATION
LANCASTER, PA.



Another—and different—cutting job done better by a Campbell Abrasive Cutting Machine . . .

The Campbell Cutamatic No. 401 was given this job because of its ability to cut large diameter bar stock to required dimension at high speed. . . . The job consists of cutting bars of 32-S Aluminum Alloy into "slugs" for forging the pistons of Aircraft Engines.

Campbell has the only complete range of Abrasive Cutting Machines

What the Campbell 401 does for this manufacturer is typical of what Campbell machines are doing all over America.

Remember, Campbell has a complete range—the only complete range—of Abrasive Cutting Machines. They are cutting solid bar, tubular, and flat stock—all grades of steel, annealed and unannealed; nonferrous alloys, plastics, glass, and ceramics.

Ask Campbell to outline cutting procedure for your company

Campbell engineers will be glad to have you use their experience. Ask them for suggested cutting procedures—and estimated cutting costs—for your work. Just state what materials you cut, the shapes, sizes, lengths before cutting, lengths of cut-off pieces and hourly production required. Your letter will place you under no obligation and will be given prompt attention.

Campbell

ABRASIVE CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION
BRIDGEPORT · CONNECTICUT

ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ACCO
AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT · CONNECTICUT

BURKE MILLING MACHINES

. . . Put Your Small Work on a Production Basis!

Those small, difficult jobs can be handled on a *production basis* with BURKE Motor Driven Milling Machines Nos. 1, 2, 3, & 4. Primarily, this is because BURKES have been *specially designed and built* to do smaller milling jobs efficiently and economically.

Then, too, a number of attachments are available . . . attachments that increase the units usability, and add to your productivity. These include a vertical milling attachment, index centers, and vises—3 types, including swivel base. Now, when production must be stepped up, is the time to investigate the profit possibilities of BURKE Milling Machines, as applied to your work.

Complete Information Will Be Sent You Upon Request—Write!

BURKE MACHINE TOOL CO.
CONNEAUT · · · OHIO

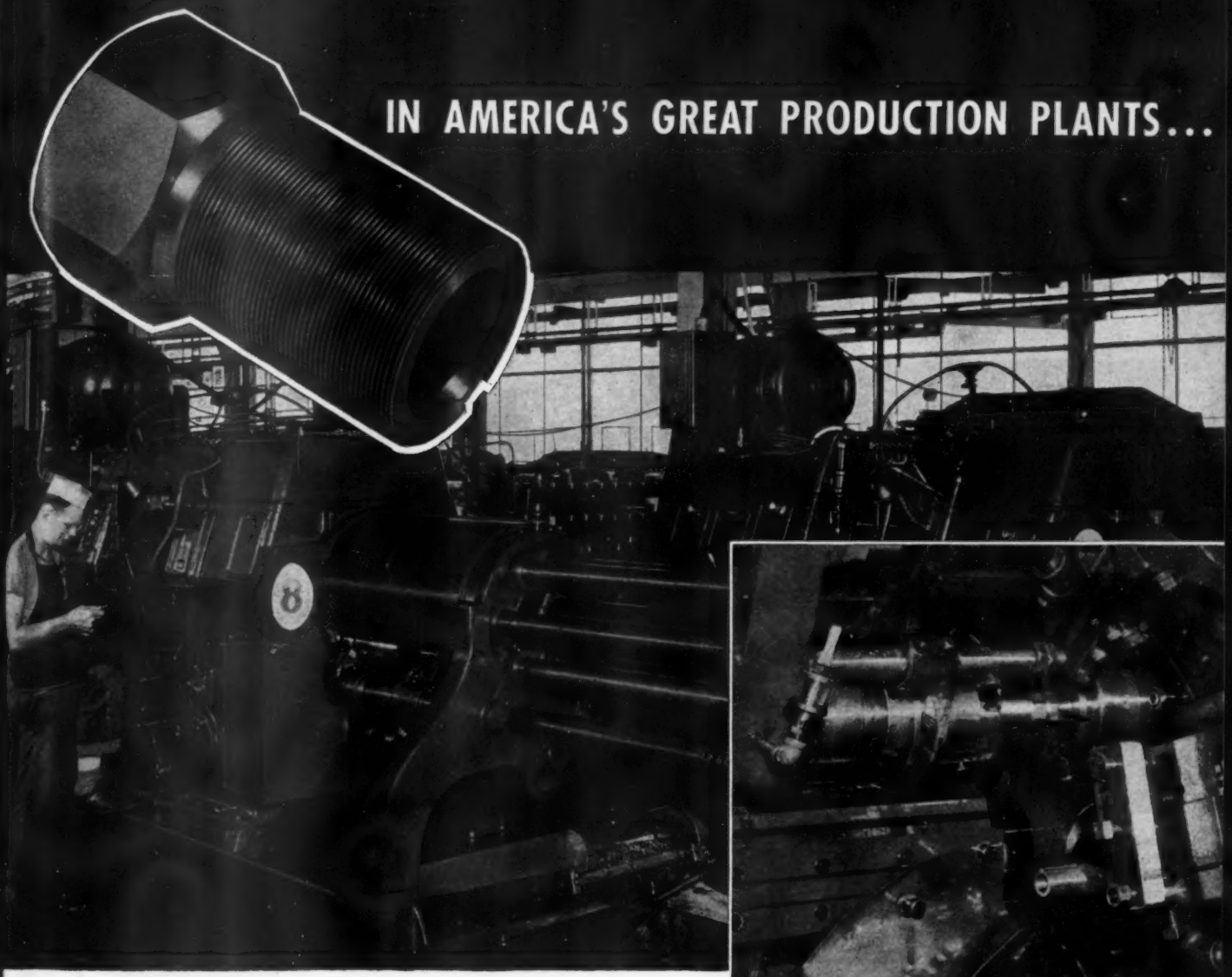
New Fixture Acclaimed by Production Men!

Piece-Part Control speeds up tapping operation — provides amazing control over accuracy of work.

The part and the machine do the "thinking." Air does the work! Operator has only to feed parts. With both hands free—with no need to use the foot pedal—operator can turn out more work—faster and better—than by any other method. Full details in TAPPING TIPS—new literature devoted largely to critical war work. Write for a copy. R. G. Haskins Company, 2761 W. Flournoy St., Chicago.

HASKINS
HASKINS *Precision* TAPPING EQUIPMENT

IN AMERICA'S GREAT PRODUCTION PLANTS...

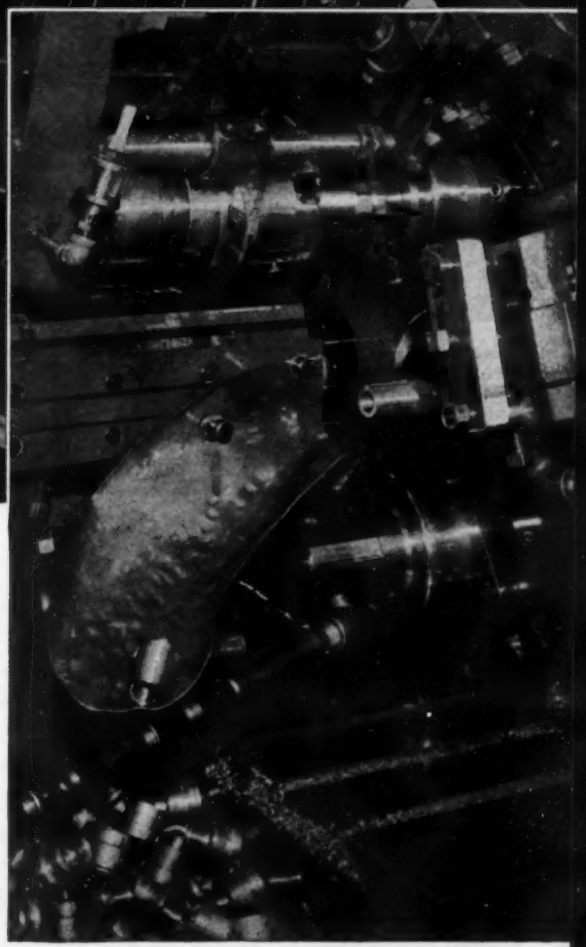


PRECISION and PRODUCTION

At speeds as great, and feeds as fast, as modern tools will withstand, Acme-Gridley Automatics are turning out parts by the hundreds of millions for America's war machine.

When their war job is done, these 4, 6 and 8 spindle bar automatics will be ready to carry on for peace time production—most of them with a simple change of tooling.

They will do their full share in building the better, more efficient and lower-priced goods we shall one day begin to create for ourselves, and for all the world.



Northern Ordnance Incorporated's batteries of Acme-Gridley Bar Automatics are working on high pressure fittings that require the utmost precision.

THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • THE CHRONOLOG • LIMIT AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

STEP ON IT!

...and STEP-UP BACK SPOT-FACING speed... accuracy

The unusual design and operation of this Buffalo-developed machine, contributes exceptional speed and precision to all types of back spot-facing, back counterboring and back finishing of areas surrounding previously drilled holes. Large convenient work table. Easily operated foot feed actuates motor "plugging" control—release of foot feed stops spindle. Efficient coolant system. The design of this machine permits use of several types of operating switches. *Bulletin F-3322 on request.*

BUFFALO FORGE COMPANY

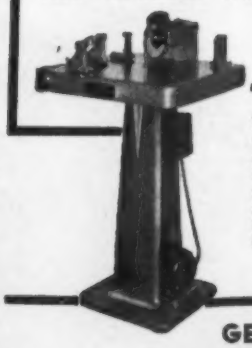
448 BROADWAY BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" **BACK SPOT-FACING MACHINES**

THE BARNES PRECISION CUTTER GRINDER

will accurately grind to any PROFILE you require . . .



for example:

fast grinding of formed cutters with assurance of preserving form exactly and lengthening cutter life five to eight times. It will grind gangs of formed cutters—plain, concave, convex or angular—shell tools—shank tools—form turning tools—cutters with undercut and spiral teeth.

Send for Descriptive Circular

GENERAL MACHINERY CORP.

140 Federal St. Boston, Mass.

HAMILTON

SWISS TYPE

GEAR HOBBERS

. . . for accuracy and speed in hobbing PINIONS, GEARS and SECTORS.

TWO MODELS

No. 00 SPUR GEAR HOBBER for work up to 2" dia.

No. 1 SPUR and SPIRAL GEAR HOBBER (illustrated) for work up to 6" dia.

Write for further details to

TRIPLEX MACHINE TOOL CORP.

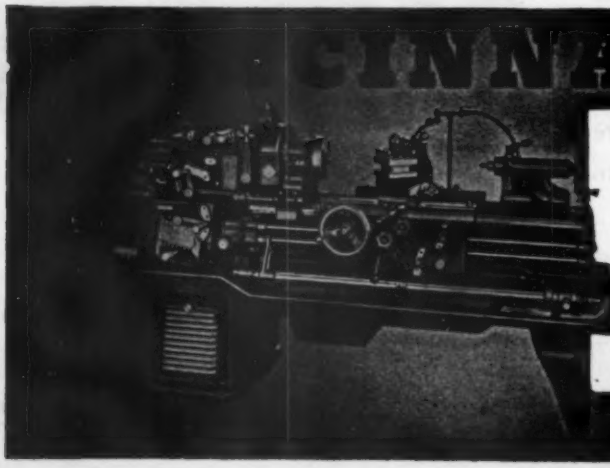
Exclusive Sales Agents

125 Barclay St., New York 7, N. Y.

THE HAMILTON TOOL CO.

Manufacturers

Hamilton, Ohio



CINCINNATI LATHES

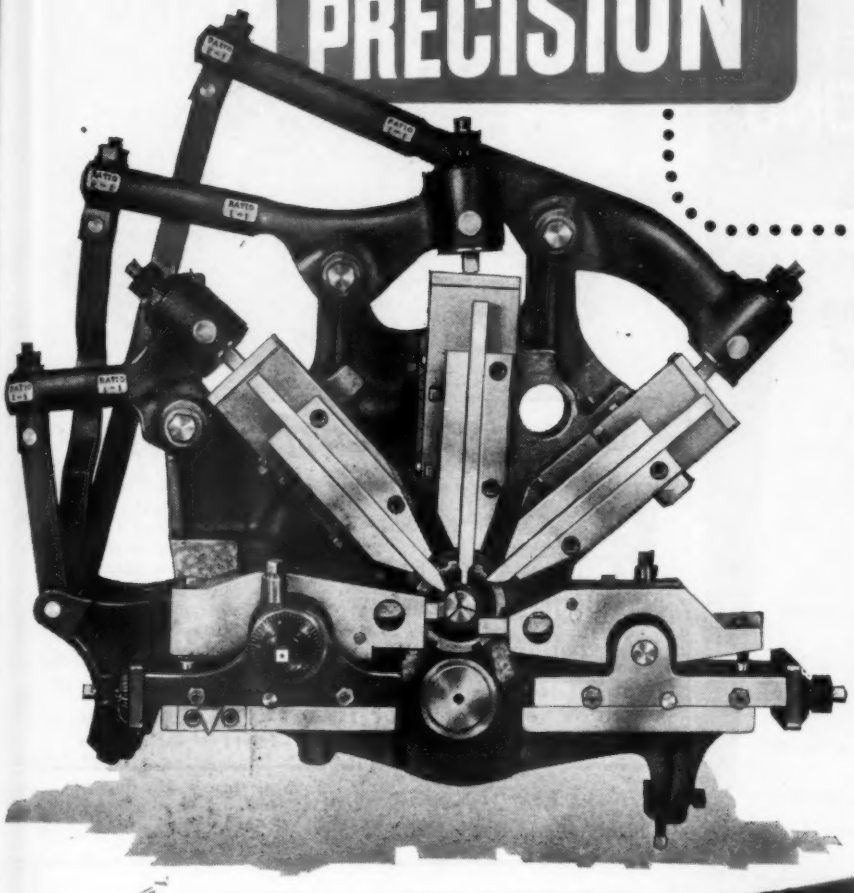
Accurate in Every Detail

Gears—precision cut, tempered and ground . . . Spindle—mounted on Roller Bearings to resist any combination of thrusts . . . Bed—extra heavy in construction . . . Ways and carriage hand scraped to a precision bearing. These features of Cincinnati Lathes add up to accuracy in every detail that insures precision results on every job. Write for complete specifications on 14" to 30" sizes to produce your work always most economically.

THE CINCINNATI LATHE & TOOL CO.

Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio

One-Operation PRECISION



Serving some of America's greatest precision-makers, including Norden, Kollsman, Sperry, Bendix and many others, the Ceco Automatic is revolutionizing the mass production of small intricate parts—cutting tool costs, speeding the set-up and producing *one-operation precision work* with amazing economy and efficiency.

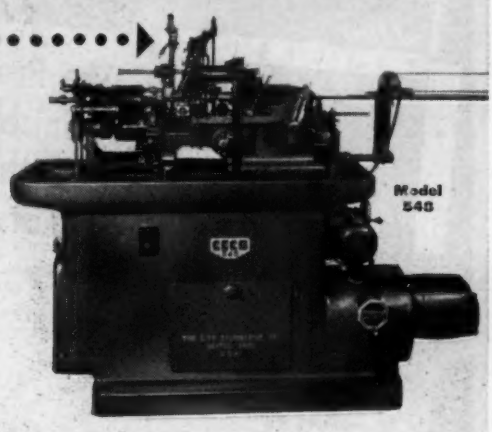
THIS BOMBSIGHT PINION SHAFT
IS AN EXAMPLE OF CECO'S
ONE-OPERATION, HIGH-SPEED PRECISION PRODUCTION

Produced by Ceco *in one operation* instead of three formerly required, and with single tip tooling, thereby eliminating form tools commonly used, is the Bombsight part reproduced above.

CECO

SWISS TYPE *Automatic*

UNIVERSAL PRECISION SCREW MACHINES



Highlight Features!

BAR CAPACITY: ⅜" and ½"

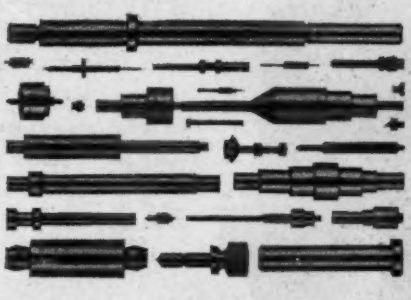
4 or 5 RADIAL TOOL SLIDES.

MAXIMUM TURNING LENGTH: 4" with flat cam.

MASTER SPEED RANGER: Varies Spindle speed from 675 to 7500 R.P.M. at the turn of a handwheel.

PRECISION ROLLER BEARING SPINDLE: Always in adjustment.

CONSTANT RISE FEEDING MECHANISM gives extreme feeding accuracy.



Shown on this page are a few of the hundreds of parts Ceco produced in *one operation* with extreme accuracy and high finish. Odd shapes and multiple diameters, also complicated forms, including tapers, bevels, radii, etc., are Ceco-produced with single tip tools. Result—quick set-up, low cost, and faster high precision production of intricate parts. For information and literature write:

THE CITY ENGINEERING CO.
DAYTON, OHIO

Since 1909, Designers and Builders of Tools, Dies, Jigs, Fixtures, Gages and Special Machinery.

Send for

The Complete Story of WET-BELT SURFACING

The Proved Finishing Method that . . .

- produces superior work, 5 to 25 times faster than previous methods.
- holds close limits, often .0005"
- works an entire area at once.
- eliminates dust or grit, injurious to other equipment and to health.
- eliminates heat, warping, distortion, discoloring, fracturing, chipping.
- needs fewer, and only simple, inexpensive jigs
- cuts set-up time and lock-up time — often eliminates both entirely.
- reduces cost of equipment, operation and maintenance.
- permits inexperienced workers to get increased production and superior finish.
- replaces other machine tools on many operations, and supplements others to improve results.

Porter-Cable's latest booklet "A New Precision Machining Method", gives you complete information on one of the most valuable machining helps for metals, stainless steel, plastics, ceramics, glass, that has come out in years. It can be sent only to those who furnish us their title, company name and address. Mail coupon for your copy today.

PORTER-CABLE

PORTER-CABLE MACHINE CO.
1725-11 N. Salina St., Syracuse, N. Y.
Mail free booklet: A New Precision Machining Method.

Name .....
Position .....
Company .....
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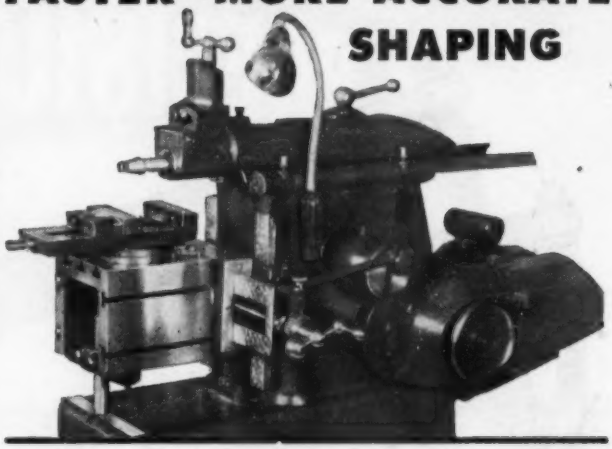
City ..... State .....

FASTER-MORE ACCURATE SHAPING



WITH *SHAPE-RITE* SHAPERS

Get these advantages at ½ less cost!
1. ACCURACY
2. SPEED
3. SMOOTHNESS
4. EASE OF USE
5. FLEXIBILITY

Regardless of speed or size of cut, this 8"-stroke shaper has no equal in performance. All working surfaces are precision-ground and hand-scraped to master gauges and all moving parts are fitted to closest tolerances to guarantee accurate work.

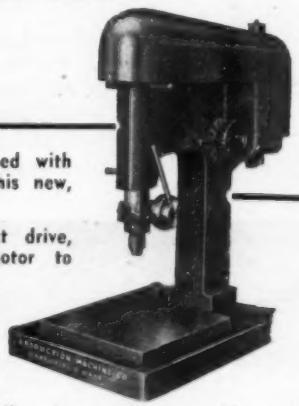
Extra-heavy ram and long ram-ways, plus helical-cut and precision-lapped gears help the Shape-Rite to give you the finest possible finish on all types of work—at *low* cost.

Sales Service MACHINE TOOL Company
2426 University Avenue • • • Saint Paul 4, Minnesota

WRITE TODAY for BULLETIN "C"
Gives new features, specifications, prices.

THE NEW TYPE 25 REED SENSITIVE BENCH DRILL

Streamlined—Sturdy—Simple and Accurate



Rugged strength is combined with precision performance in this new, highly efficient machine.

A totally enclosed direct drive, with single belt from motor to spindle is offered. No moving part is exposed except the drill chuck.

Infinite speed variations —from 1500 to 10,000 R.P.M. controlled by hand-wheel insure utmost versatility for handling a wide variety of light work.

Made in 1, 2, 3 and 4 spindle types, with one motor and one belt to each spindle. Spindle is precision mounted in ball bearings.

SPECIFICATIONS

Capacity—¼"
Spindle Travel—3"
Adjustment of Head—3"
Center spindle to column—7"
Spindles center to center—8"
Motor—½ H.P. Ball Bearing

Write for circular giving complete details

PRODUCTION MACHINE CO.
Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.
GREENFIELD, MASS., U. S. A.

GRAND RAPIDS SURFACE GRINDERS

★

PRODUCTION MACHINES

Model F and Model A Machines providing for a maximum longitudinal table speed of 150 feet and 125 feet per minute and guaranteed to function smoothly and quietly at maximum speed are illustrated and described in bulletin GL-4-10-43.

★

GRAND RAPIDS Production Type Hydraulic Feed Surface Grinders manufactured by the GALLMEYER & LIVINGSTON COMPANY are designated as model F and model A and feature the use of wide faced wheel and cross traveling head.

MACHINE DETAILS

BASE: A heavy, rugged one-piece base is always at least twice the length of the working surface of table so that working surface never overhands the base in normal operation.

COLUMN. Column is also a heavy, rugged one-piece casting with walls at least 1" thick and heavy, properly designed rubs are used to provide for maximum stiffness.

SPINDLE: GRAND RAPIDS Production Type Hydraulic Feed Surface Grinders are equipped with spindles of heat-treated alloy steel accurately machined and run in special precision flanged type ball bearings with spring maintained overload. The heavy, rugged head which carries the grinding wheel spindle mounted in vertical ways cast integral with column and the elevating screw is placed directly beneath the weight it carries so that any tendency toward a bureau drawer or cramping action in the vertical movement is eliminated.

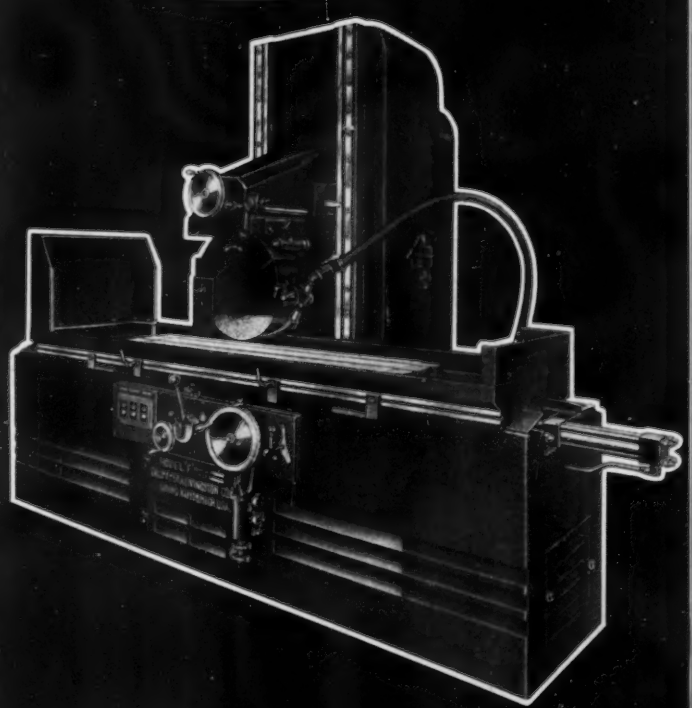
TABLE SPEED: The use of Vickers vane type pumps and control valves designed by GALLMEYER & LIVINGSTON COMPANY engineers make it possible to provide for maximum longitudinal table speed of 150 feet per minute in the case of the Model F machines, 125 feet per minute in the case of the Model A machines, and to guarantee the machines to function smoothly and quietly at maximum speeds.

CONTROLS: Finger-tip control is featured in both types with controls so conveniently located as to add real pleasure to the operation of these machines.

GRAND RAPIDS Production Type Hydraulic Feed Surface Grinders are illustrated and described in bulletin GL-4-1-43. Write for your copy today.

FOR *faster* PRODUCTION

20" x 25" x 60" Model F GRAND RAPIDS Hydraulic Feed Surface Grinder is equipped with special automatic downfeed and diamond trueing device.



GALLMEYER & LIVINGSTON CO.

330 STRAIGHT AVE. S. W.

GRAND RAPIDS, MICHIGAN

"Blount"

"COMBINATION" MODEL J

WET TOOL GRINDER

meets todays need for speed and accuracy

This machine is a valuable contribution to fast production. It is equipped with straight faced wheels for wet grinding, is remarkably convenient in operation and can be depended on for cool, clean grinding.

Modern and improved features include:

. . . heavy column with ample coolant tank and water pan of generous capacity.

. . . guards of heavy cast iron with hinged covers and adjustable spark protectors.

. . . centrifugal motor-driven ball bearing pump with all bearings above water line.

. . . spindle of high carbon steel, machine turned and ground.

. . . deep groove ball bearings protected against grit.

. . . exclusive design Blount grinding rest incorporating coolant ejector which assures cool tools and clean wheels.

. . . totally enclosed motor with manually operated switch having overload protection.

. . . foot treadle switch (available as an extra) keeps machine running only while operators foot depresses treadle.

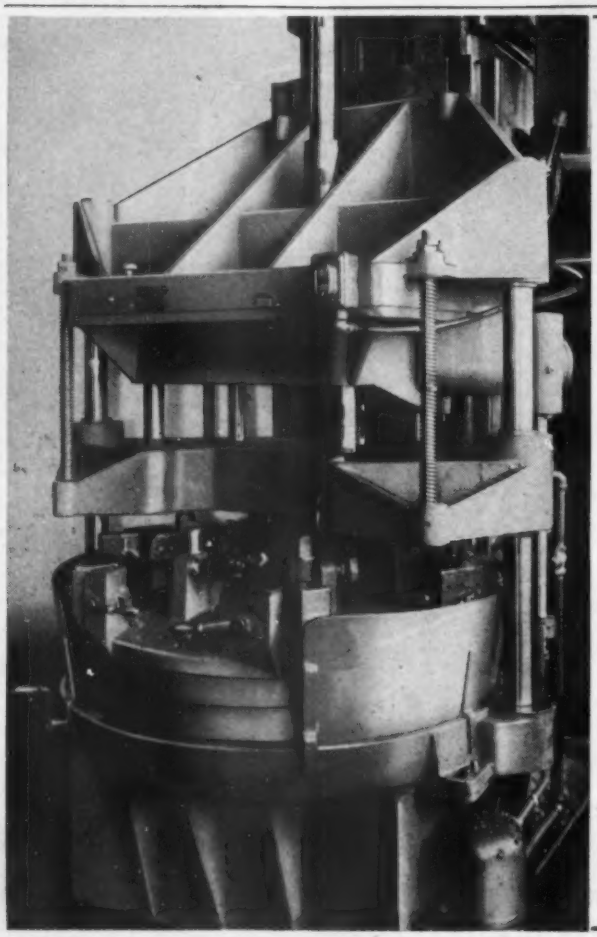
Write for Bulletin A-8

COMPLETE DETAILS AVAILABLE ON REQUEST

CONDENSED SPECIFICATIONS

Base of Column—22" x 19½"
Height base to spindle—37½"
Spindle Arbor—1¼"
Wheels 12" x 2" x 1¼"
Between wheels—22½"
Spindle speed—1750 R.P.M.
Motor—2 HP.

J. G. BLOUNT COMPANY *Everett, Mass., U.S.A.*



Buhr COMPLETE RETOOL *that* INCREASED PRODUCTION

Complete Retool of a Vertical Hydraulic Drill Press

Consists of:

5-Spindle Multiple Drill Head with one accelerated spindle for reaming in the fourth station.

Bushing Plate.

Six Fixtures mounted on a plate attached to a six-position Index Table with compound trough.

This mounts on a base which is used as a compound tank.

Buhr retooling combines speeding up and simplifying operations. Users of Buhr equipment are getting the added advantage of rugged construction, stamina that permits continuous operation on the toughest wartime jobs.

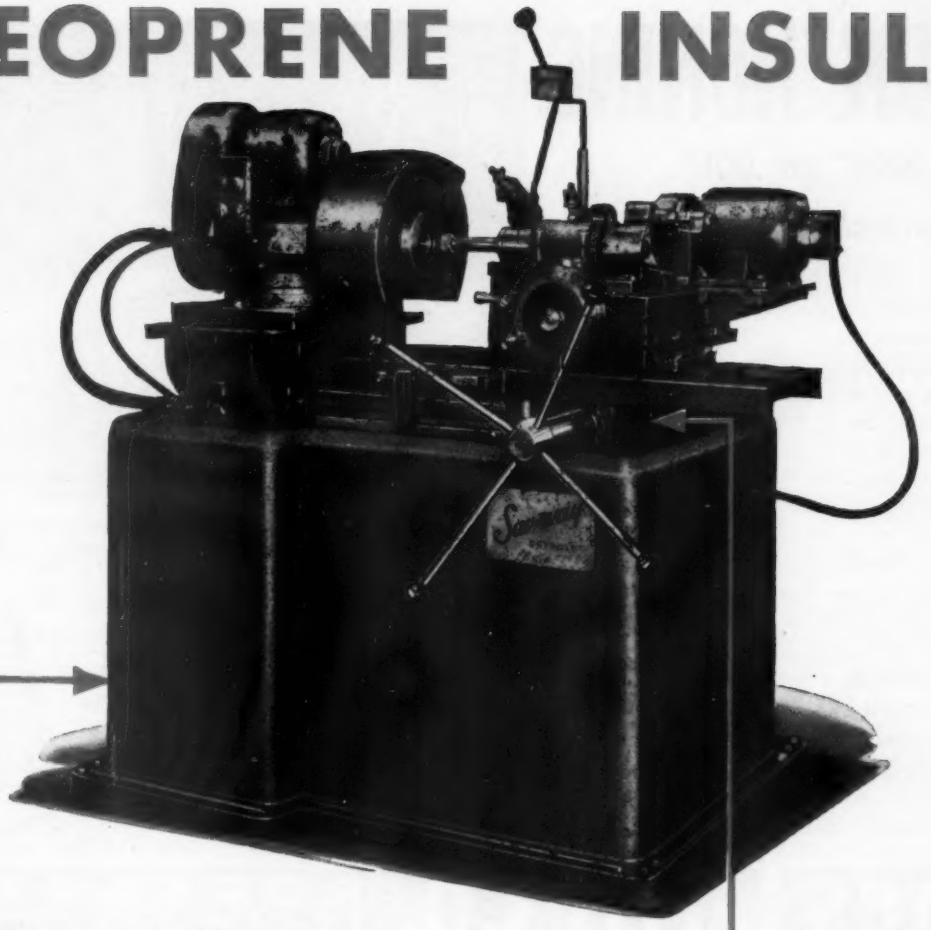
BUHR MACHINE TOOL CO.

Green and Davis

ANN ARBOR **MICH.**

Specialists in Multiple Spindle Drilling, Boring, Reaming, Tapping Equipment

NEOPRENE INSULATED



against Vibration, Distortion, Misalignment!

This radical departure from conventional design gives the Sav-Way multi-purpose internal grinder a new permanence of alignment and resulting higher accuracy. The bed proper is a thick surface-plate type normalized alloy iron casting of heavily ribbed whale-back construction. Neoprene pads between the bed and the steel base eliminate metal-to-metal contact and absorb floor vibration, preventing distortion of the base being transmitted to the bed, which is accurately scraped. This is only one of seventeen specific features which make the new Sav-Way M-1-A Grinder outstanding in design and construction.

For complete description and specifications, attach the coupon to your letterhead.

Send the Coupon for Your Copy

KEEP AN EYE ON

Sav-way INDUSTRIES

Machine Tool Division

4875 EAST EIGHT MILE · DETROIT, MICHIGAN

PRODUCERS OF SAV-WAY HAND AND HYDRAULIC INTERNAL GRINDERS · SAV-WAY SOLID SEAL SPINDLES · PLUG GAGES · PRECISION AIRCRAFT AND AUTOMOTIVE PARTS

SAV-WAY INDUSTRIES, 4875 E. 8-Mile Road
Detroit, Michigan

Kindly send me a copy of the illustrated folder describing the Sav-Way M-1-A Internal Grinder.

Name_____

Position_____

Firm_____

Address_____

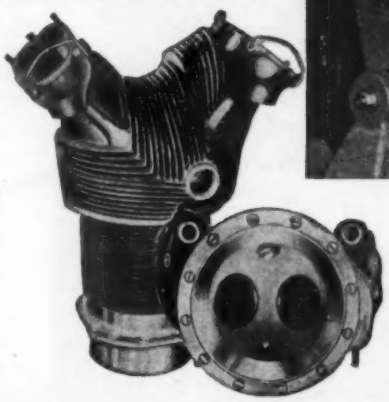
City_____ State_____

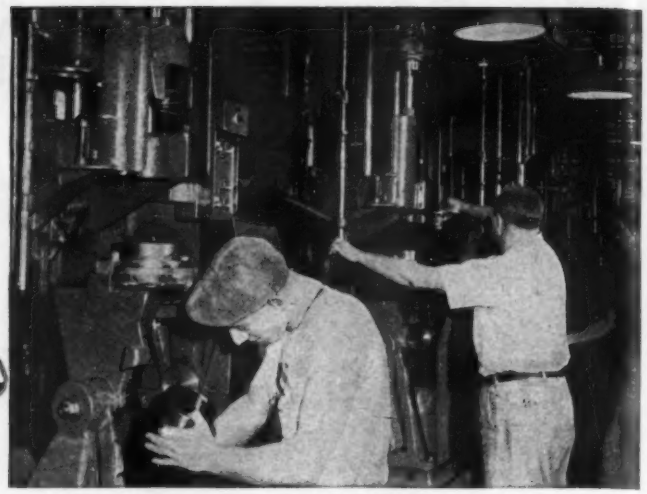
PRECISION HONING

within .0005″ to .001″

in aircraft production . . . . . .

BARNESDRIL Honers provide precision accuracy within .0005″ to .001″ in aircraft production. This kind of accuracy and surface finish is essential in the aircraft industry for best performance of their products. Honing removes defects of previous operations and corrects inaccuracies in rough machined bores.





Part of battery of BARNESDRIL *No. 307 Honers arranged with trunnion tip-over jigs honing aircraft radial engine cylinders.*

Adapt Honing to Your Work

BARNESDRIL Honing Machines are made in vertical, horizontal, and angular types with one or more spindles. BARNESDRIL engineers will recommend the proper type and model of honing machine for your specific production requirements.

Made of very hard metal, these Wright Cyclone Cylinders demand the most rigid requirements for precision finishing and are honed quickly by BARNESDRIL *Honers.*

Free Honing Data

Complete details of the honing process and our entire line of Honing and Drilling Machines are contained in Bulletin A. Send for a copy now.

Barnes Drill Co. 830 CHESTNUT STREET ROCKFORD ILLINOIS, U. S. A.

AT The Ohio Crankshaft Company, Cleveland, grinding the surface of counterweights, a vital part of the two-throw aviation crankshaft for radial motors used in such important planes as the B-25 Bomber, the Grumman "Avenger" torpedo bomber, the Curtiss "Hell-diver" and the Army A-25 dive bomber . . . a very precise job with specifications calling for close limits. Another example of the wide scope of precision grinding by ARTER ROTARY SURFACE GRINDERS.

ARTER

ARTER GRINDING MACHINE COMPANY

WORCESTER, MASSACHUSETTS • U. S. A.

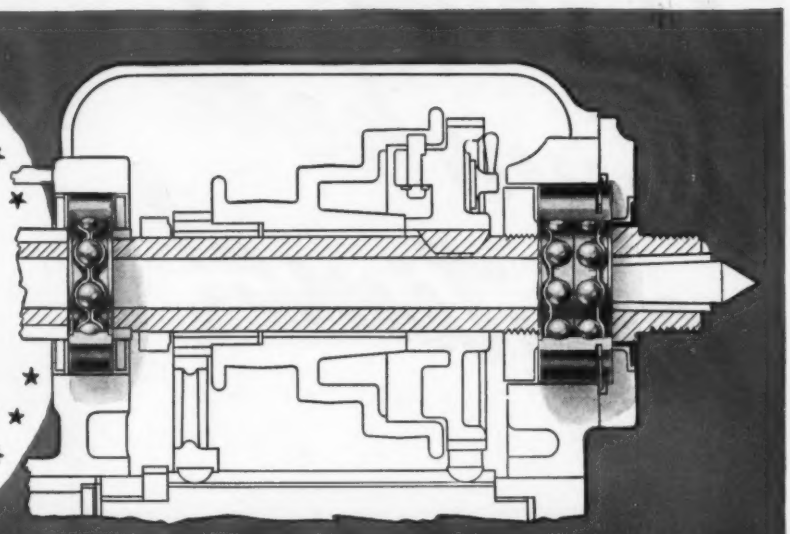
ARMY E NAVY

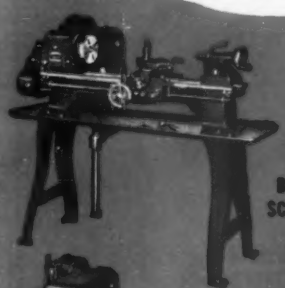
SUSTAINED *Spindle Accuracy!*

A FINER FEATURE OF LOGAN LATHES*

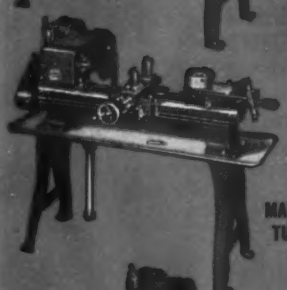
Brief
SPECIFICATIONS

- Swing over bed 10½"
- Bed length 43⅛"
- Spindle hole 25/32"
- Precision ground ways: 2 prismatic "V" ways; 2 flat ways
- 12 spindle speeds—30 to 1450 per minute





NO. 200 BACK GEARED SCREW CUTTING LATHE



NO. 850 MANUFACTURING TURRET LATHE

NO. 820 QUICK CHANGE GEAR LATHE

Precision, Pre-Loaded Ball Bearing Headstock is Standard Equipment on All Models

Your purchase of a lathe is an investment. To be profitable, it should be a *long term* investment in speedy, accurate production. It will be if the lathe is a Logan, because Logan engineering designed it that way . . . throughout! For example, to assure sustained accuracy of the spindle, the headstock is equipped with special New Departure Ball Bearings. These bearings, of extreme precision, are pre-loaded so that the pressure of the cutting tool . . . either radial or thrust . . . causes a minimum deflection of the spindle. In addition to "pre-loading" . . . these ball bearings are grease sealed . . . requiring no lubrication and no adjustment for their entire life. Moreover, the higher operating speed of the Logan Lathe, due to its ball bearing spindle mounting, enables a shop to take every advantage of modern, high speed cutting methods. Production is increased and unit costs reduced.

Write for catalog sheets so that you can compare before you buy.

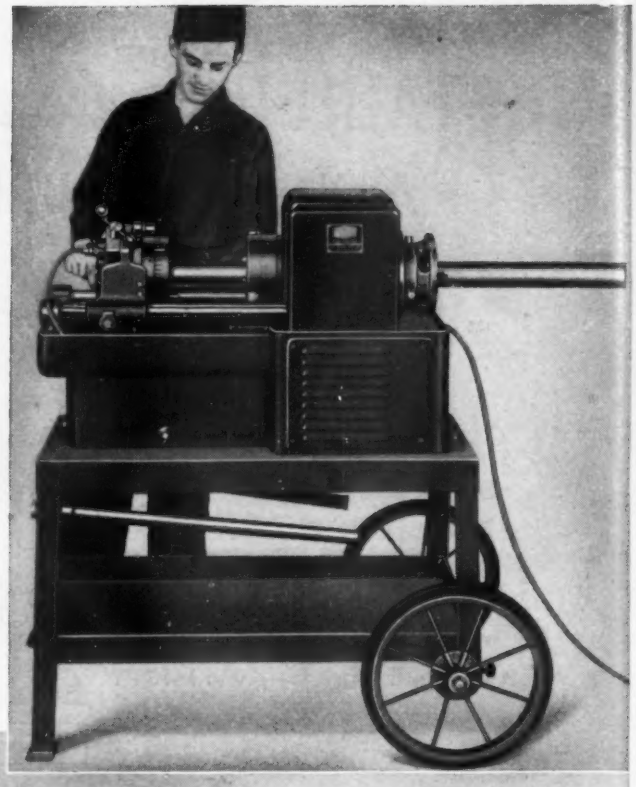
LOGAN ENGINEERING COMPANY
CHICAGO 30, ILLINOIS

Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

*This advertisement is one of a series describing the finer features of Logan Lathes . . . Look for the next of the series

READY FOR *Threading Anywhere Anytime!*



OSTER NO. 562 "TOM THUMB"

Quick action on a wide range of threading jobs is "meat" for the No. 562 "TOM THUMB" Threading Machine. Standard equipment includes the complete machine for bench use. But, where portability is required, the machine can be furnished with an all-steel wheel stand, as illustrated.

You have the option of quick-opening, fixed die-head or quick-opening, individual, quick-change die-heads and dies.

The bar operated front gripping chuck is designed to hold stock as short as 2½" for threading on one end. *Both* ends of nipples as short as 3½" in the 2" size can be held and threaded without using a nipple chuck. (Other sizes of proportionately short stock can be held and threaded easily.)

Oster No. 562 "TOM THUMB" has 19 distinctive features which combine to make it the most modern machine of its type. Write for illustrated CATALOG No. 8-E.

Regular range of the Oster No. 562 "TOM THUMB" is ¼" to 2" pipe. Extra range from 2½" to 8" pipe is threaded with a Universal Drive Shaft through which the machine drives geared die-stocks as illustrated. Bolt range of machine is 5/16" to 1¼" N.C. or Whitworth; 5/16" to 1⅛" N. F. or B. S. F.

OSTER *for faster, better threading*

THE OSTER MANUFACTURING COMPANY, 2049 EAST 61st ST., CLEVELAND 3, OHIO, U. S. A.

A flexible machine that is the last word in simplicity of operation

HI-SPEED HONING and LAPPING MACHINE

for use with any standard make honing head

HONES CYLINDERS up to 20" in diameter . . . with STROKES from 20" to 72" . . .

IDEAL FOR PRODUCTION JOBS INVOLVING:

Aircraft parts . . . Ordnance parts . . . Diesel engines . . . Compressors . . . Pumps . . . Internal combustion engines . . . Steam cylinders, etc.

Speed up war work involving internal cylindrical surfaces by utilizing a HI-SPEED Honing Machine. When used with proper honing head of any standard make, the HI-SPEED machine produces accurate, straight, round, smooth bores—amazingly fast.

Unique positive stop and dwell system makes it possible to stop the spindle without shock or impact at the bottom of each stroke, at any point within the stroke range and hold the spindle without reciprocation, at that point up to 1½ minutes. Ideal for "blind hole" honing and straight line lapping or honing.

All controls are located at the front of the machine at the operator's station . . . No ladders to climb . . . Stroke setting, hone withdrawal, short stroking at any point, changes in speed of reciprocation or rotation of the spindle made instantly from operator's station.

The HI-SPEED Honing Machine is made in 4 sizes, any one of which can be had with strokes up to 72"...Designed for use with any standard make of honing head.

Tell us your requirements—and our engineers will promptly furnish you with complete information, prices and early delivery dates.

Illustrated is No. 0 Machine equipped for 36" stroke with 80" under the spindle.

NOTE THESE SPECIFICATIONS:

Model No.	No. 0	No. 1	No. 2	No. 3
Stroke (standard)	20"	36"	48"	72"
Working Base Area (standard).. Auxiliary Tables available	21" x 22"	31" x 31"	31" x 31"	48" x 54"
Height Under Spindle Nose (up).. Added Height Available on Order.	48"	60"	75"	100"
Spindle Diameter	2⅛"	2¾"	2½"	2¾"
Spindle Speeds Through Gear Box	4	4	4	8
Main Drive Motor (standard)	7½ hp	10 hp	15 hp	20 hp
Coolant Pump Volume, Motor Driven	14 gpm	18 gpm	18 gpm	25 gpm
Maximum Bore possible to hone with standard spindle drive motor..	10" Dia	12" Dia.	16" Dia.	20" Dia.
Maximum Overall Diameter of Cylinder possible to place on standard base	18"	27"	27"	44"
Floor Area	44"x60"	60"x80"	60"x80"	60"x108"
Overall Height	11'6"	15'3"	18'3"	23'8"

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Over our factory flies the ARMY-NAVY "E"—awarded for excellence in the production of machinery and tools vitally needed to win the war.

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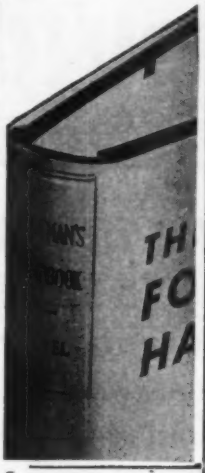
Here is a working tool to help you in running your department—a real handbook that gives you in concise, usable form the working data, the actual proved methods, and the carefully-sifted background information every line foreman needs today to make the most of his job.



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This authoritative reference book emphasizes the kind of practical information a foreman needs in his work, to make the most of his job and to develop it beyond the point at which he assumed it. It covers every phase of the foreman's functions, from direct day-to-day responsibilities in handling people and supervising production to the background of economic, legislative, and management fundamentals needed in winning advancement. How do other foremen handle the kind of "headaches" that come to you? You can get the answers—right answers, based on proved experience in representative plants—from this great new handbook.

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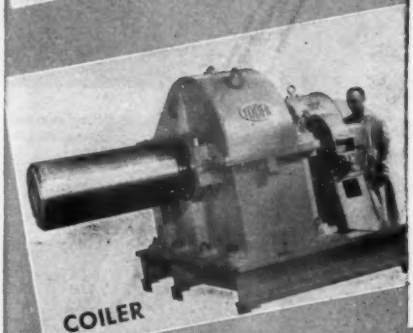
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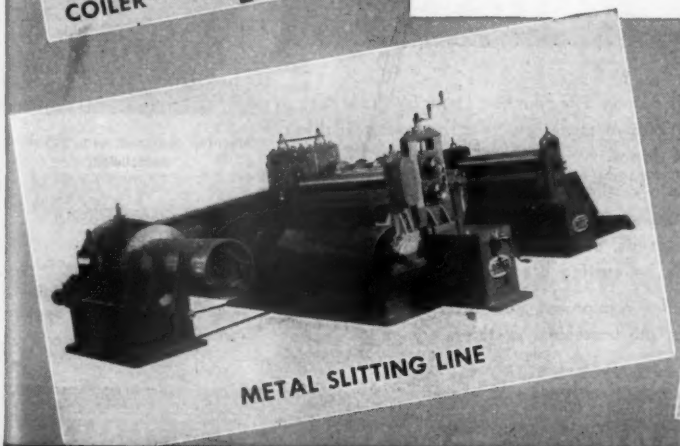
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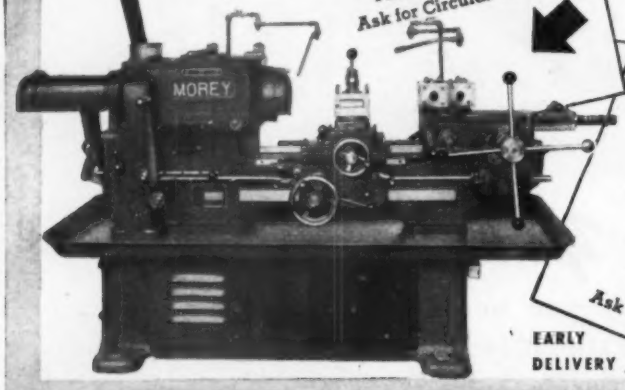
HIGH PRODUCTION METAL WORKING MACHINERY

MOREY TURRET LATHES
for BAR or CHUCKING { UNIVERSAL or PLAIN

3 UNIVERSAL

For bar stock up to 1½" in diameter
10" turning length
16½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM. constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A



2 PLAIN-GEARED

For bar stock up to 1" in diameter
Turning length 6½"
Swing over cross slide 6"
Swing over bed 14"
Infinite spindle speeds:
Minimum of 60 RPM.
Maximum of 2000 RPM.
Constant horsepower at all speeds.
Ask for Circular 629A

4 UNIVERSAL

For bar stock up to 2" in diameter
12" turning length
19½" swing over bed
Infinite spindle speeds: 35 to 1500 RPM, constant speed motor, 1200 RPM
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ARMY E NAVY

THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.

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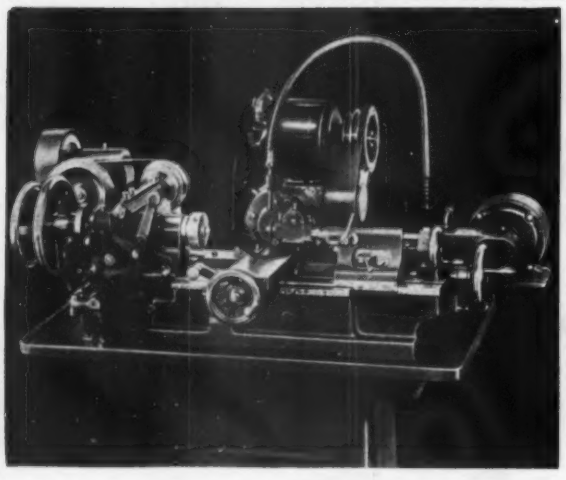

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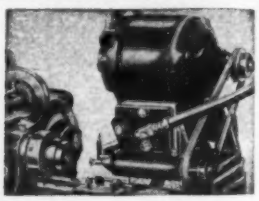
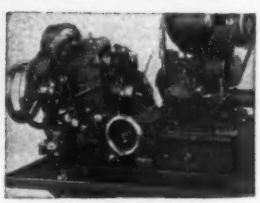


Waltham Thread Miller equipped with Internal Threading Attachment



Machine equipped with Relieving Attachment

SPECIFICATIONS

Swing over carriage 3"
Capacity (Diameter of work) 2" or smaller
Thread length (work held on centers) 8¾"
Thread length (work held in spring chuck at one end) 10"
Diam. hole through spring chuck ⅝"
Diam. hole through work spindle ¾"
Floor space 48" x 34"
Motors: 1/3-¼ and 1/6 HP.

Precision threading is put on a production basis by these fast, convenient, accurate Waltham machines. Cutters are available for all standard thread forms.

Machine is equipped with three motors—for speed, feed and oil. Individual speed change and reverse are provided for cutter and work. Motor speeds, controlled from a convenient central point, are available for cutting brass or steel.

A wide range of extra equipment and attachments can be furnished for extending the usefulness of this machine.

Write for literature giving complete details and specifications.

WALTHAM MACHINE WORKS WALTHAM MASS.
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Your newest trainee can't forget these "safety goggles" — they're built-in . . .

Extra convenience, efficiency, safety . . . with this

Delta Tool Grinder

You would expect to pay much more — perhaps several times as much—for the features and all-around quality you find in this low-cost Delta machine.

Delta's patented Twin-Lite safety shields minimize the risk to the most inexperienced operator. They increase efficiency and accuracy by flooding the work with light . . . on both sides and face of the wheel . . . at all times, regardless of general lighting conditions in the shop.

This is just one of many features which give you the finest working combination on the market — regardless of price — for all-around industrial grinding. Simple, easily adjusted attachments enable operators to do accurate drill grinding, etc. with a minimum of training.

Safety shields: Double thickness shatter-proof glass. Two lamps wired to motor switch. Wheel guards meet strict safety regulations of Wisconsin Industrial Commission.

Tool rests fully machined, accurate. Fully adjustable, easily detached.

Wheels: Absolutely true and vibrationless for accurate, satisfactory results. Balanced to 1/100-inch ounce.

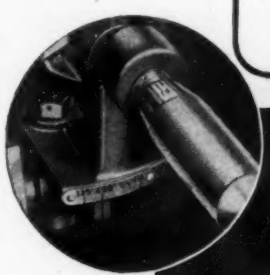
Size: One-inch face by 7-inch diameter, 5/8-inch hole.

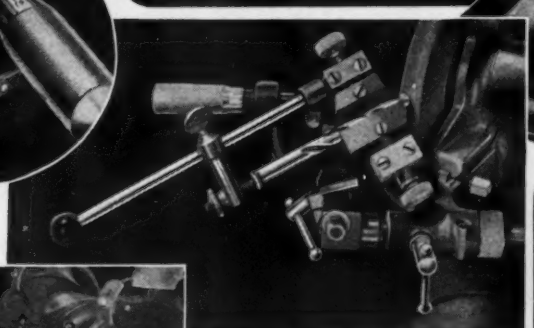
Type: 60N and 46M aluminous oxide.

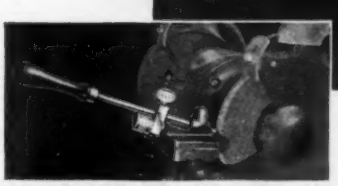
Bearings: Precision double-sealed New Departure ball bearings — lubricated for life, protected against damage from abrasive dust.

Heavy Base, 14½" x 15½". Tool rests 39" from floor.

Price complete F.O.B. Milwaukee, (depending on type of motor required). $72.00 to $89.50. A-1-A priority required.







Drill Grinding Attachment — with accurate scale for setting to the drill angle you need for the job. Left: Holder for Wheel Dresser (Dresser not included).

See Your Delta Industrial Distributor

He can give you information on this and other low-cost Delta machines—including latest data on priorities, deliveries, etc. (Delta sells only through distributors). Then install one of these efficient machines — for results that are a lasting credit to your good judgment. Mail the coupon for new Delta catalog.

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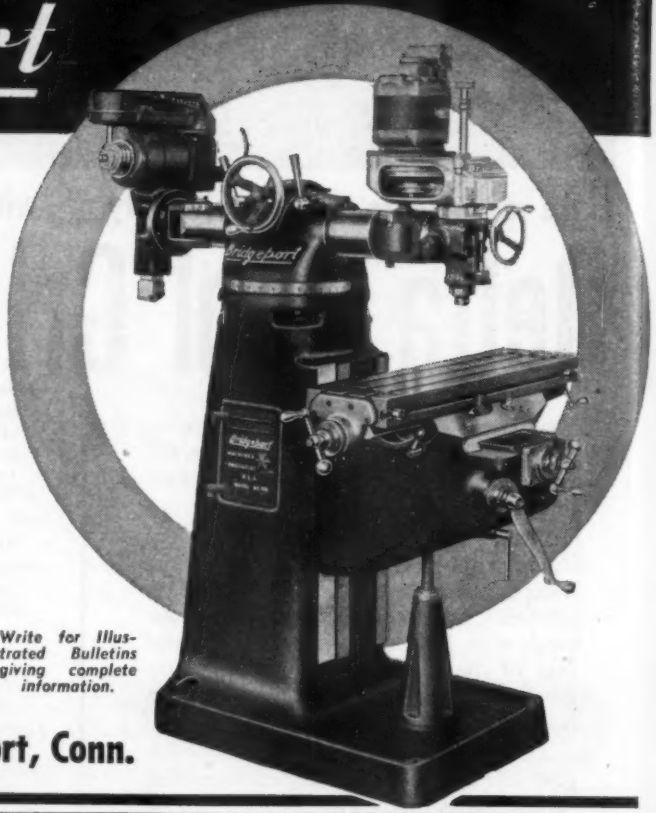
Announcing a new shaping attachment by Bridgeport

This new sturdy accurate attachment — for which a tremendous demand has existed — is at last in production and available for use on existing Bridgeport Turret Milling Machines now in the hands of users. It can also be mounted on all types of milling machines and on special production equipment.

As applied to "Bridgeport" machines it is mounted on the back end of overarm and can be set for operation at all angles. It provides a fast, convenient and practical means for shaping large and small die and mold work. It is extensively used also on intricate production jobs where slotting operations are necessary.

The Bridgeport Turret Milling Machine — a machine of outstanding versatility and flexibility — features the Bridgeport Milling Attachment which enables it to handle drilling, boring and milling at all angles without changing set-up of work. All modern features of the conventional milling machine are available which with this attachment makes the Bridgeport a universal machine of unparalleled utility.

Bridgeport High Speed Milling Attachments, like the Shaping Attachment, can be mounted on milling machines of all types and on many types of special production equipment.



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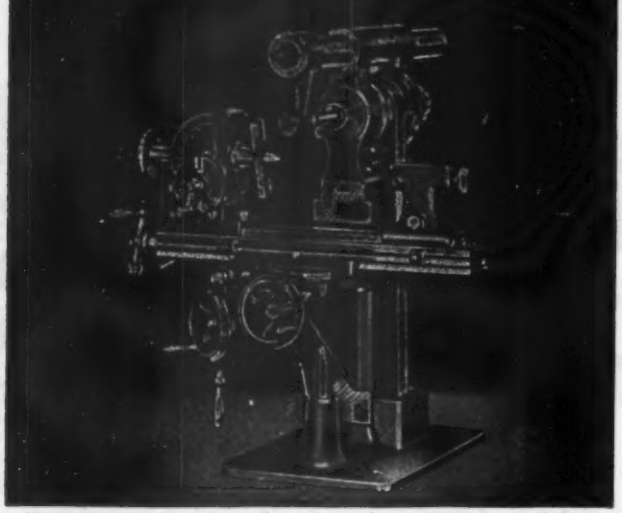
BENCH MILLING MACHINE



For most accurate toolroom and production milling. Large in size and capacity. Cutter head and indexing head take same 1" capacity collet. Separate headstock for vertical milling. Motor and jackshaft-drive.

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The NEW "ABRASAW" No. 47

CUT-OFF MACHINE

This pedestal type machine — improved and streamlined in appearance and construction — provides machine and base in a single casting. Large coolant tank is now in base of machine with coolant pump at the rear.

Vises can be furnished for straight or combination straight and angle cuts.

Capacity: Solids up to 1"; tubing and light sections up to 2".
Floor Space: 28" x 50".

Send for complete details.

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This low cost machine will handle internal keyseating jobs up to 1¼ in.

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Giant KEYSEATERS

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

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SIMPLEX PRECISION BORING MACHINE MAINTAINS ACCURACY AND FINISH

This prominent mid-western manufacturer, when switching from non-essential production to a wartime job, installed Simplex Unit-type Precision Boring Machines for all boring operations requiring a high degree of finish and accuracy.

This two-way or duplex-type machine is used to bore from both sides of the pump housing simultaneously. Diameters are held to ±.0005", insuring precision fits to bearings and oil seals.

SPECIAL PRECISION BORING MACHINES WITH GENERAL PURPOSE VERSATILITY

Simplex Precision Boring Machines are designed with adjustable units so that either short-run precision boring or production boring can be accomplished. Spindles are adjustable, and the machines can be provided with one or more spindles as desired. Over 25 different basic models of Simplex Precision Boring Machines have been designed to meet practically any type of precision boring problem.

Our engineers will be glad to make a study of your parts and production for faster and better precision boring.

Send part prints and production figures . . . no obligation.

PRECISION BORING DATA

PART—Pump Housing.

MATERIAL—Cast Iron.

HOLDING METHOD—Special Holding Fixture.

MACHINE—#2U 2-Way Simplex Precision Boring Machine.

OPERATIONS—Precision Bore Bearing and Oil Seal Fits and Chamfer One Bore.

TOLERANCES—±.0005" Dia.
—±.005" Depth.

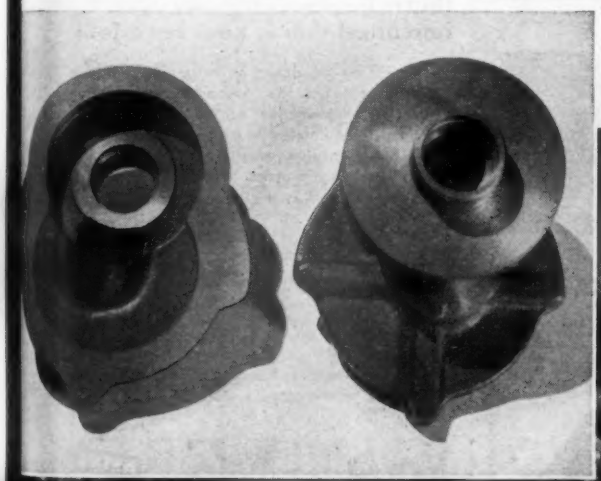
FEED—1⅞" per Minute.

SPEED—1150 r.p.m.

FLOOR-TO-FLOOR TIME—8 Minutes, including inspection.

FREE DATA

Write for these two booklets covering our complete line of precision boring machines. Complete specifications of each type are included. Ask for Precision Boring Machine booklets.



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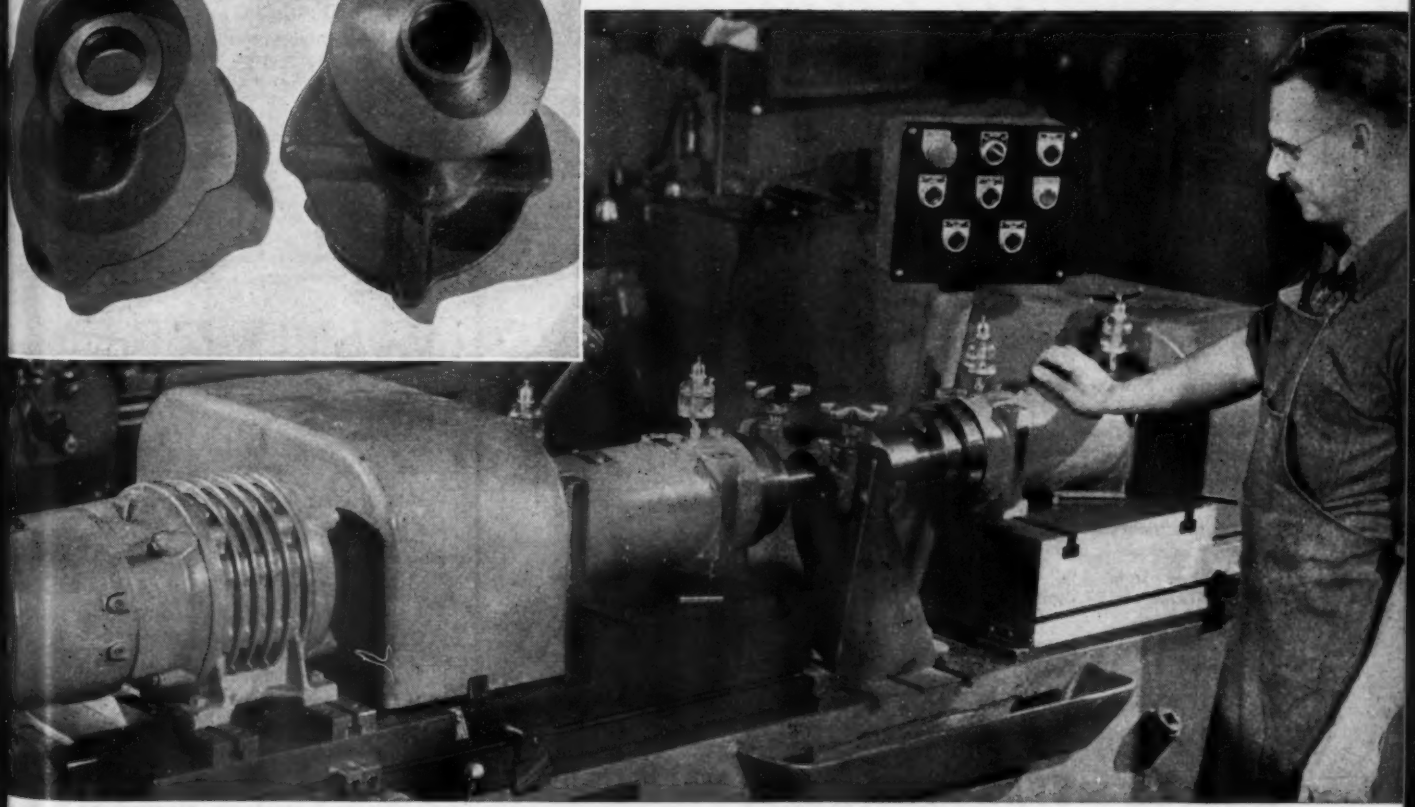

STOKERUNIT CORPORATION

DESIGNERS AND BUILDERS OF PRECISION BORING MACHINES AND MILLING MACHINE

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3. Three-High Mills for strip and ingot reduction
4. Two-High Mills for sizing, embossing and breakdown
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7. Roll sizes from 1½" diameter and 1" face to 16" diameter and 18" face
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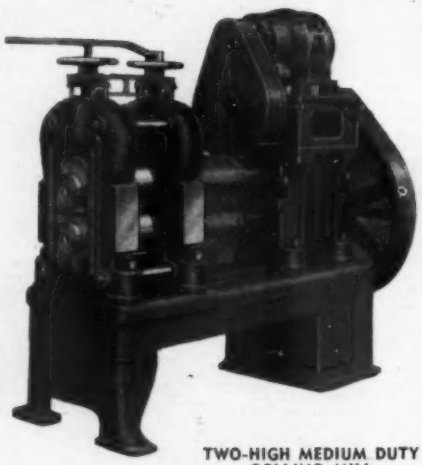

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STANDARD MACHINERY CO.
PROVIDENCE 7, RHODE ISLAND

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SPEEDI-DRI

is cleaning our floors,"
writes
Don M. Sawyer, Personnel Manager
BLISS & LAUGHLIN, Inc.
Buffalo, N. Y.

Among our many unsolicited letters of praise for SPEEDI-DRI is one from Bliss & Laughlin, Inc., makers of cold-finished steels and shafting, in which they say: "We attempted to clean up the oil and dirt with soaps and powders but none was satisfactory. But after only one application of SPEEDI-DRI, the oil and dirt have been practically eliminated and the clean concrete is once again showing up. We were skeptical, at first, that SPEEDI-DRI would clean our floors and also provide a firm footing. Now there is absolutely no doubt in our mind that it does both jobs."

There'll be no doubt in *your* mind, either, once you try this remarkably effective product that soaks up oil and grease, retards fire, saves workmen's shoes from oil rot, improves employee morale (especially among women workers), brightens up the shop, cuts the cost of housekeeping and conserves vital manpower by saving on materials and labor, and helps to reduce insurance rates by cutting down slipping and falling accidents. That's a lot for one product to do, but SPEEDI-DRI does it!

Try SPEEDI-DRI in *your* plant. Prompt service from warehouses in leading cities. Unlimited, priority-free supply.

Ask for demonstration or free sample. If water or water-soluble oils are used, request SOL-SPEEDI-DRI.

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OIL AND GREASE ABSORBENT

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New!

Close-Coupled

FOR TOP-SPEED MILLING!

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KENT-OWENS 2-20V VERTICAL MILLER BUILT WITH 3 GAPS

42" by 12" Table . . .
20" Table Travel . . .
Hydraulic Table Feed

★ With the new Kent-Owens No. 2-20V Vertical Milling Machine you can start milling jobs *right*... with the *right gap* for greater rigidity and top-speed production.

This machine is furnished at the factory with any one of three gaps from table to spindle nose. The base machine has a maximum gap of 10″ . . . maximum gaps of 12″ or 14″ are available . . . each having 4″ vertical quill adjustment. This close-coupled construction provides unusual rigidity and thus permits using maximum feed rates. Send for new bulletin. Kent-Owens Machine Co., Toledo, Ohio.

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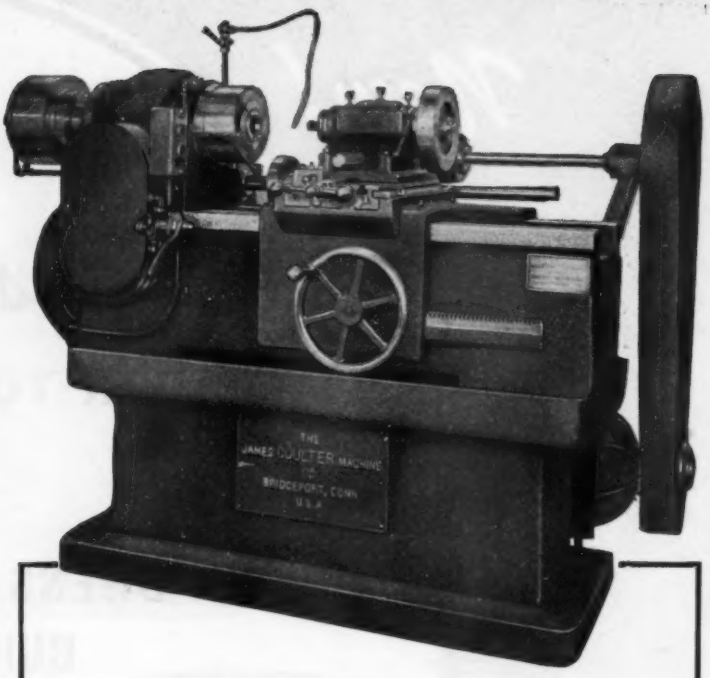
Call on **KENT-OWENS** *for Milling Machines*

Keep Ahead of DEFENSE DEMANDS on the PRODUCTION of EXTERNAL and INTERNAL THREADS



The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

The James COULTER Machine Co.
BRIDGEPORT • CONNECTICUT • U.S.A.

PORTAGE
HORIZONTAL BORING, DRILLING AND MILLING MACHINE NO. 4

• Featuring an extended saddle and table with outer rail support for maintaining exceptional accuracy on long work. Get fully acquainted with the many features of this modern Boring Mill. *Ask for a copy* of our new instructive bulletin which points out the numerous advantages of this new Horizontal Boring, Drilling & Milling Machine.

THE PORTAGE MACHINE CO.
AKRON 11, OHIO

ABRASIVE INTERNAL GRINDER

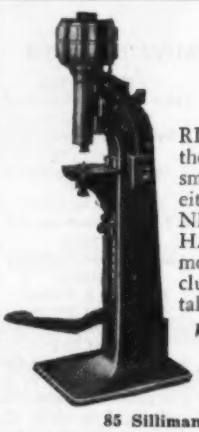
No. IG

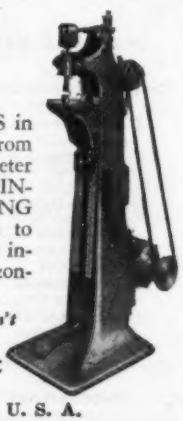
Get acquainted with the complete line of Abrasive Grinding Machines.

Write for descriptive literature illustrating the unusual versatility and range of this machine.

ABRASIVE MACHINE TOOL COMPANY
EAST PROVIDENCE, R. I.

GRANT



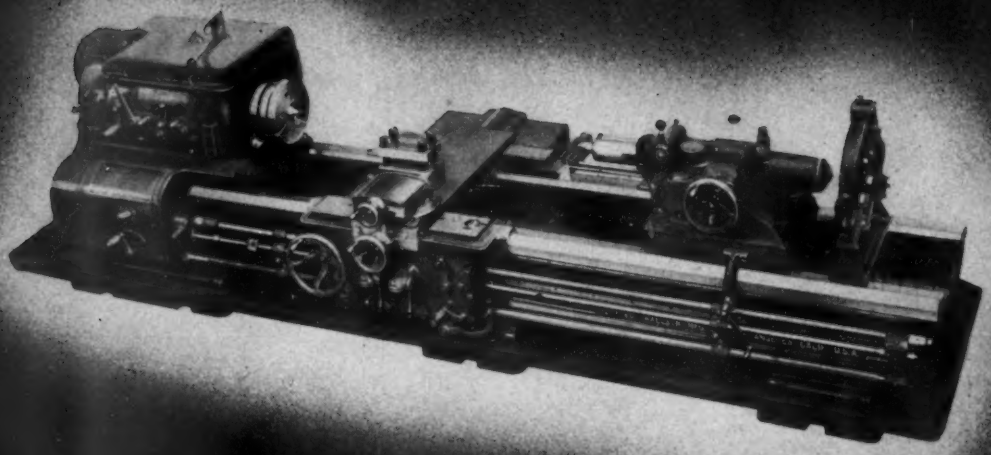


RIVETERS — PIONEERS in their line—head rivets from smallest to 5/8" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

DEPENDABLE FOR MORE THAN A QUARTER CENTURY



If you are faced with turning problems you can't faze—check up on Axelson heavy duty engine lathes For over twenty-five years Axelson has been engineering and building quality lathes that are designed to handle the toughest production jobs — whether it's turning to the finest precision tolerance or making the heaviest roughing cut. Hundreds of users throughout the United Nations will tell you that to get more in precision production—at a lower per-piece cost—put it on an Axelson!

AXELSON MANUFACTURING CO.

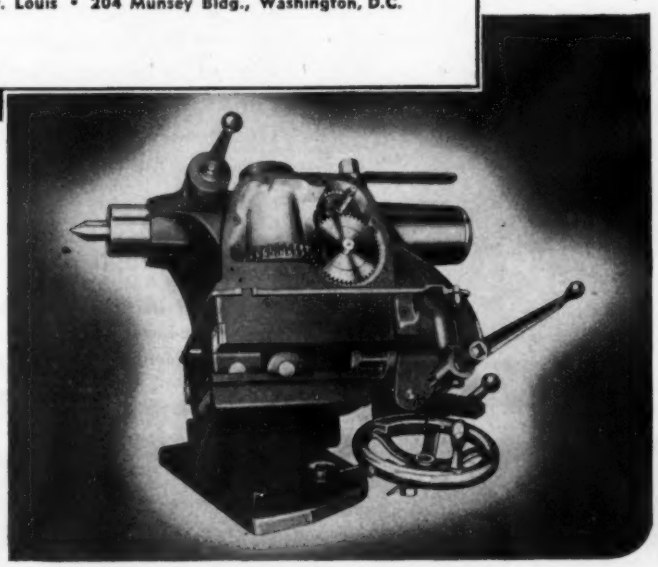
6160 S. BOYLE AVE. (P. O. Box 98, Vernon Station) LOS ANGELES, CALIF.

50 Church St., New York • 3844 Walsh St., St. Louis • 204 Munsey Bldg., Washington, D.C.

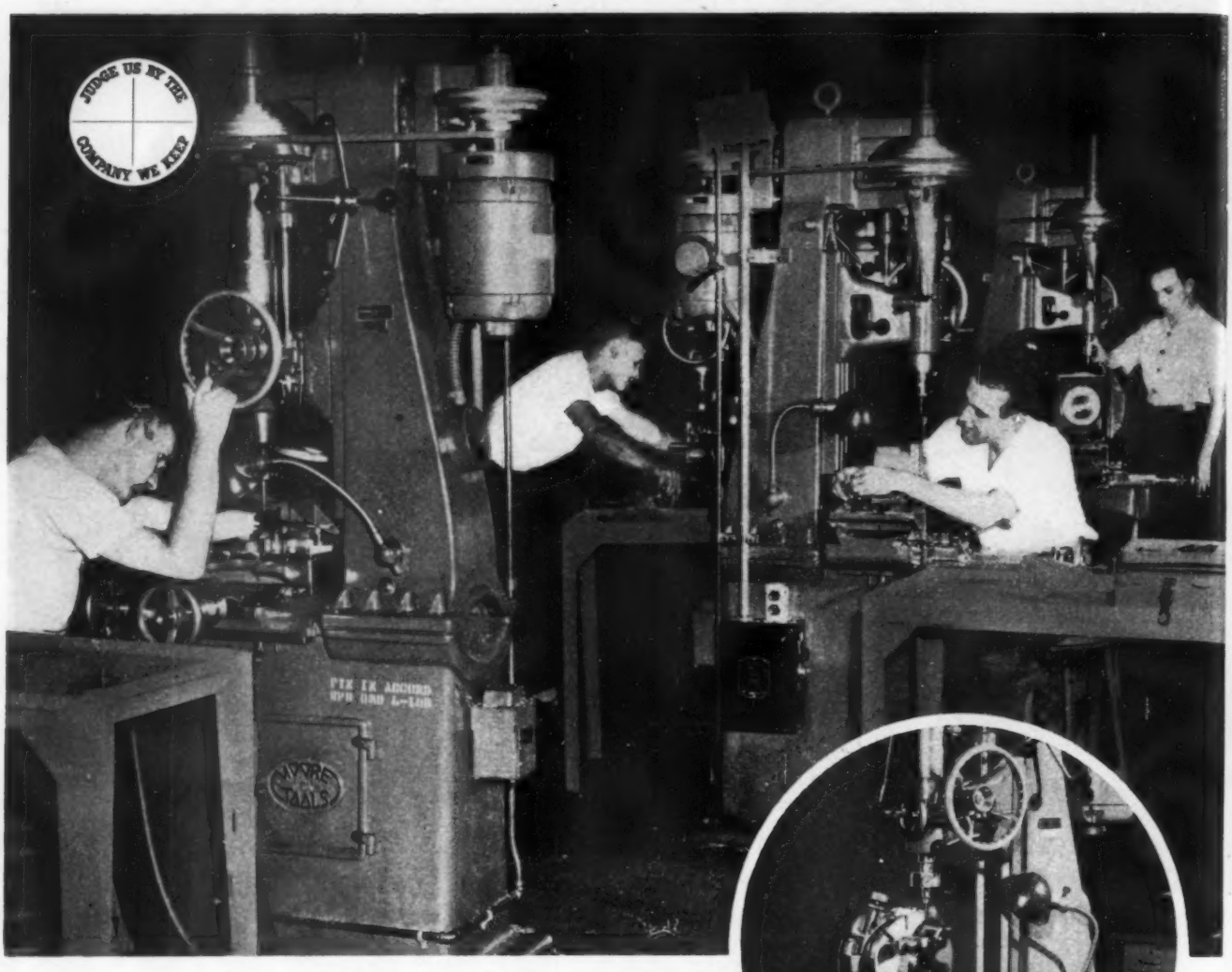
BUY MORE WAR BONDS!

ARMY E NAVY

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY



The Axelson patented two speed tailstock represents a basic improvement in lathe design and is just one of the exclusive features found on Axelson lathes. Through the use of a gear change mechanism two rates of longitudinal motion are obtainable for the tailstock spindle The high speed is used for ordinary work swung between centers, while the low speed provides a slow but powerful spindle movement which when used for drilling operations allows uniform feeding of the tool. All gears and moving parts are designed to give maximum trouble-free service life



Photos Courtesy of Sperry Gyroscope Co., Inc.

SPERRY . . .

DEMANDS 'MICRO-ACCURACY'

Moore Jig Borers Reply With .0002" Tolerances

○ ○ ○ High on the list of war devices upon which Uncle Sam's armed services depend for their striking power are those that bear the name of SPERRY. Tolerances in tenths are the rule rather than the exception at the Sperry Gyroscope Company, Inc.

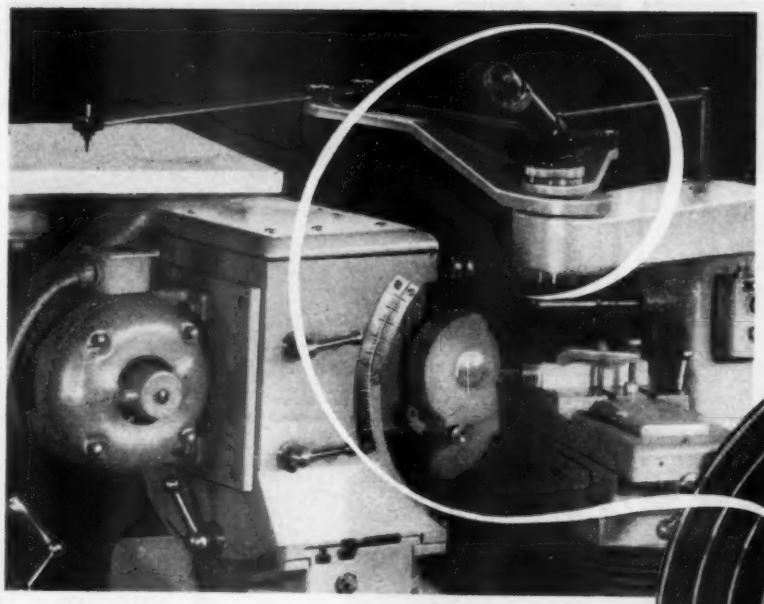
The Moore Jig Borer meets all requirements of accuracy, efficiency and ease of operation for the boring of holes in jigs, fixtures, dies, gauges and special, accurate machine parts. It is highly sensitive for holes of 1/32" diameter and yet rugged for heavy cuts up to 4½". Operators can spot, drill, ream and bore in one uninterrupted sequence.

PARTNER in Production ○ This companion machine, the Moore Jig Grinder, corrects and finishes jig-bored holes on both hard and soft work within .0001". We will be glad to show you how the "Partners in Production" can modernize your toolroom operations.

MOORE TOOLS

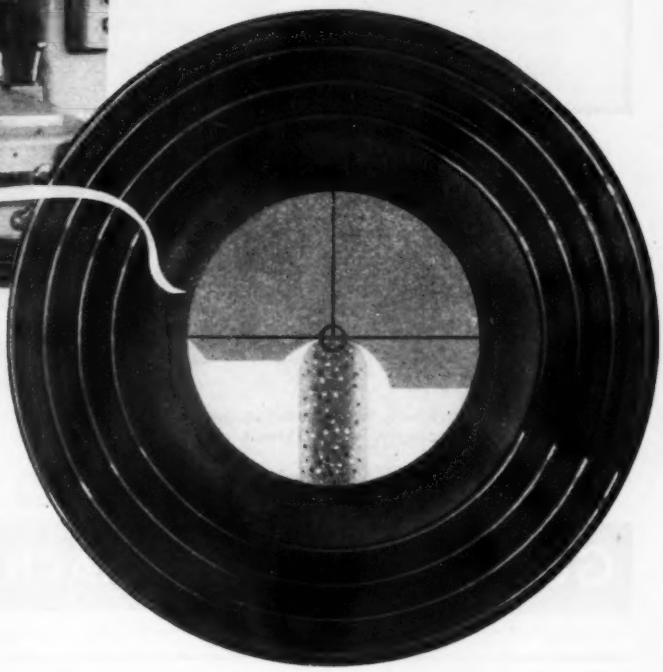
MOORE SPECIAL TOOL COMPANY INC.

740 UNION AVENUE, BRIDGEPORT 7, CONN.



Here's

WHAT YOU SEE THRU THE 'SCOPE



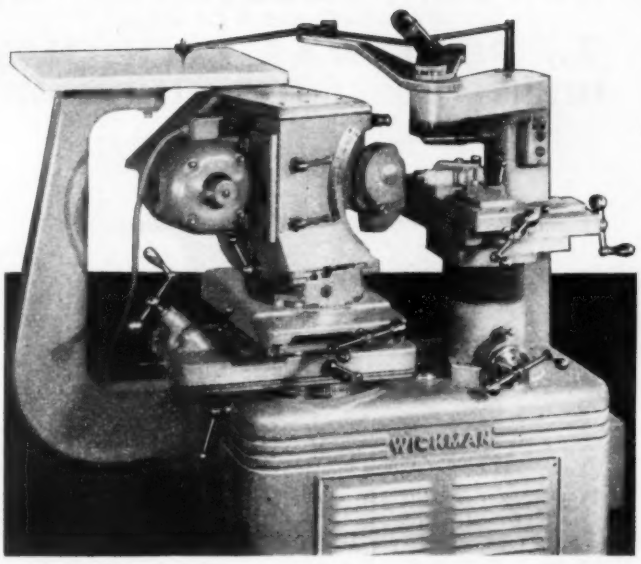
During Accurate Grinding Of Any Desired Profile

Profiles being ground on the Wickman Profile Grinder are constantly inspected as the work progresses. When the work is completed no further inspection or checking of the part is necessary.

The cross hairs in the optical center of the 30 power microscope are focused on the work and grinding wheel. The intersection of these cross hairs corresponds to the position of the pantograph pointer on a 50 times size layout of the profile to be ground.

The grinding wheel is manually fed to the intersection of the cross hairs after each movement of the pantograph arm and its exact position is observed through the microscope. The work is always viewed in the operating plane, even though a clearance angle is being ground.

Innumerable forms can be ground on this machine in any material including tungsten-carbide. Accuracy can be held to .0005″ and on occasions even closer. WRITE FOR FULL DETAILS.

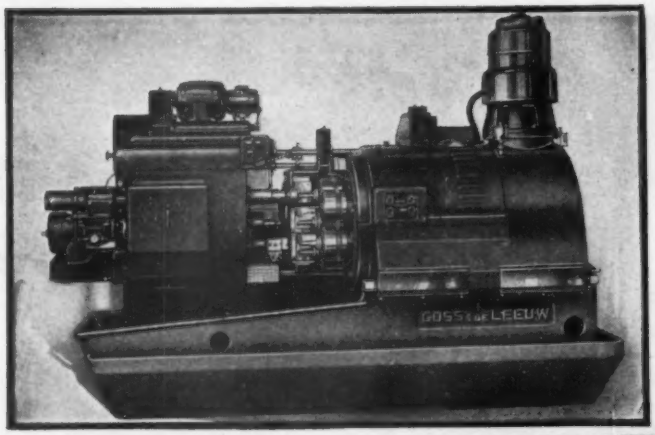


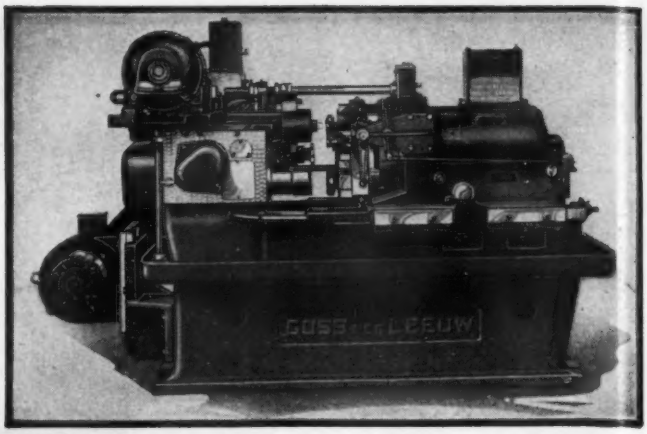
BUY WAR BONDS

WICKMAN PROFILE GRINDER

THE Wickman CORPORATION

15539 WOODROW WILSON AVE.
DETROIT, MICHIGAN





WORK ROTATING TYPE

5 Spindles
6 Spindles
8 Spindles

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

TOOL ROTATING TYPE

4 Spindles
5 Chucking Positions

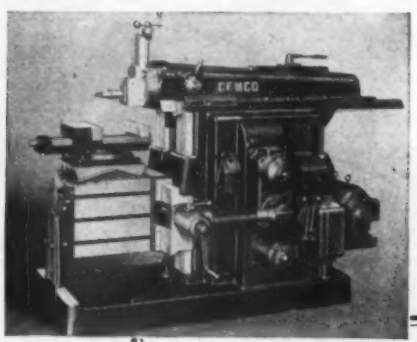
On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

Complete details will be found in descriptive catalog available on request.

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

For **TODAY'S REQUIREMENTS**
...S-P-E-E-D and ACCURACY
For **POST WAR ECONOMY**
PRECISION PRODUCTS at LOW OPERATING COST!



Your answer is with
GEMCO
SHAPERS

Replace those old worn-out machines **now** with a **"Gemco"** for producing better **Postwar** products at a challenging rate.

★

Write for Bulletin GC-12A giving complete specifications on Plain, Production, and Universal Types.

Prompt Deliveries

GEMCO *Features*
FOR HIGH ACCURACY AND POST-WAR ECONOMY

1. **Exclusive "Lubrigard"**—Assures longer precision life for a profitable investment.
2. **Grouped Controls**—Save time and effort for increased production.
3. **Twin Type Bull Gears**—Helical type—for powerful, quiet operation and minimum wear at all speeds.
4. **Massive Construction**—For maximum rigidity and stamina on heavy cuts.
5. **Large, Easy-To-Read Dials**—For quick, accurate adjustments during cutting operations—Save man hours.

GENERAL ENGINEERING & MFG. CO. ST. LOUIS 4, MISSOURI

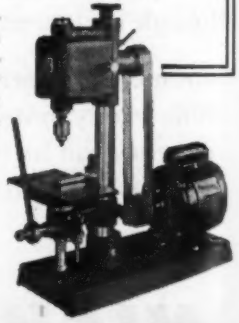
For Sensitive Tapping of Precision Work

HAMILTON-MUEHLMATT SENSITIVE TAPPING MACHINE

• Here's a high speed, sturdy little tapping machine which is especially adapted to precision tapping of light work. It is now being used very successfully for tapping parts for instruments, cameras, watches, clocks and business machines.

It has gained wide acceptance due to the high quality of work produced because of its particularly smooth operation without breakage of even the finest taps.

Mechanically simple and easy to operate, a man can become expert in an hour or so of operation. Quiet—no noisy reversing mechanism nor slinging of oil. Can be plugged in any light socket. For full information write for bulletin.



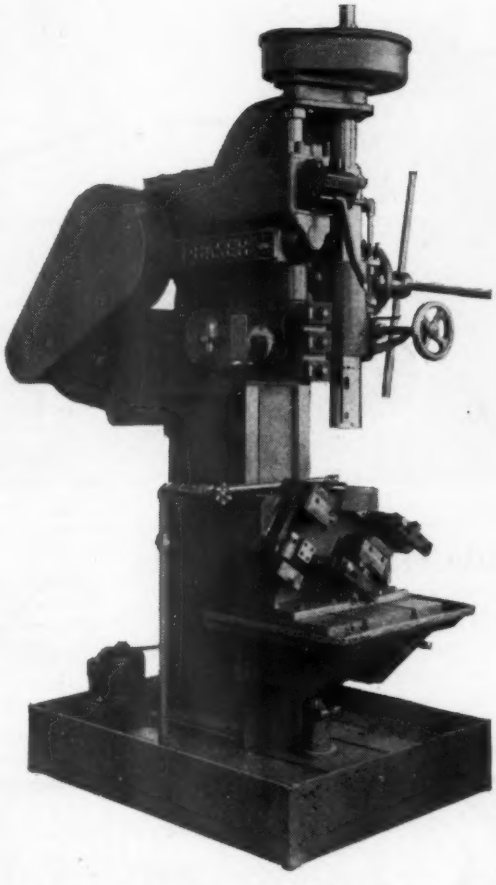
PERTINENT DATA

Capacity—From smallest and finest tap to 10-32 inclusive.
Power 1/6 H.P. 1750 R.P.M. Motor either CI-AC or compound DC.
Tapping speeds approx. 1200 to 2600 R.P.M.
Size of machine—16 in. x 7 in. x 22 in. high
Weight—Approx. 60 pounds

The Hamilton Tool Co.
830 NINTH ST. HAMILTON, OHIO

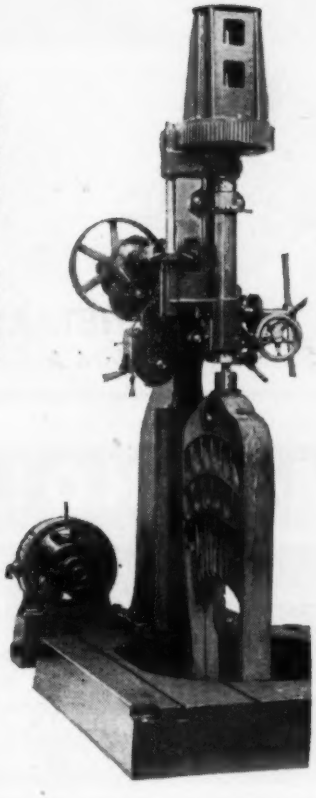
BAKER

Models—Current *and* OBSOLETE



• Compare the big, rugged, highly efficient heavy duty drill at left with the Baker Drill of 1890-1906 vintage at right, to see how far Baker Brothers have come in designing and building modern production machinery.

Yet, traditional Baker quality was such an integral part of these early models that many of them are still performing valiant service in war production.

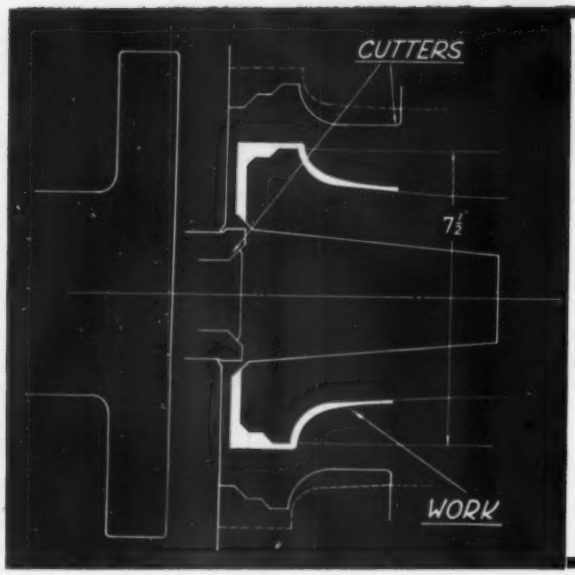


The Baker Model 314-A heavy duty drill is built to take tough jobs of drilling, boring, and tapping, in its stride. Construction is rugged to withstand the strain of hard-driving, continuous production on tough metals. This machine has power and grit—it can drive three inch diameter high speed twist drills to the limit of their efficiency in steel. Vertical two-piece design allows use of spacer blocks between lower and upper frames to give added clearance between the spindle and table top. Another important feature to remember is that these Baker machines are flexible for re-tooling—either for weapons of war or products of peace.

BAKER BROTHERS, INC. • Toledo, Ohio, U.S.A.

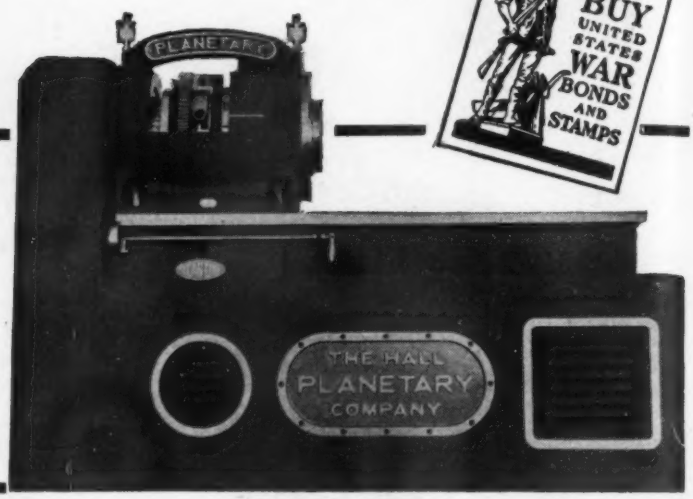
DRILLING • BORING • TAPPING

Our Motto Since 1867: "Machines Sturdy and Efficient, as Fine as Can Be Built..."



. . in 8 minutes on the PLANETARY

The machining of Propeller Shanks is completed in eight minutes each on the Planetary. This includes the simultaneous machining of all external surfaces as indicated by the heavy lines on the above drawing. Close "aircraft" accuracy is easily maintained on the Planetary well within the requirements.



HALL PLANETARY MILLER

Send Us Your Prints

The HALL PLANETARY COMPANY
Fox St. and Abbotsford Ave., Philadelphia, Pa.

MILLHOLLAND

Automatic DRILLING - BORING MILLING - TAPPING Units

½ to 20 HORSEPOWER DRIVE

AUTOMATIC and SEMI-AUTOMATIC PRODUCTION MACHINERY

W. K. MILLHOLLAND MACHINERY CO.
Indianapolis, Ind.

Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002" limits. Ask for special bulletin —also circulars on Drill Pointers, Point Thinners, Cutter Grinders and Tool Grinders.

OLIVER OF ADRIAN PRODUCTS

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.

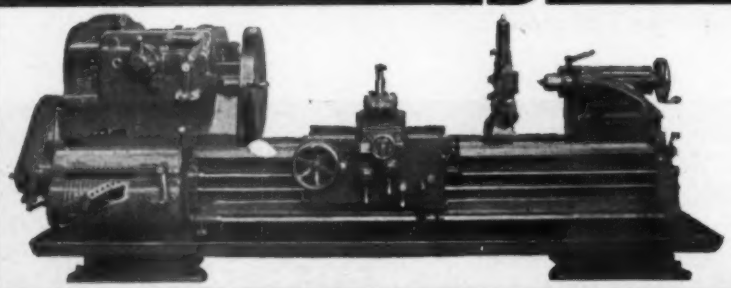
LELAND-GIFFORD COMPANY · WORCESTER MASS. U.S.A. · MACHINE TOOLS · CRANK SHAFTS

Drilling and Tapping Machines

(Automatic and Semi-Automatic)

LELAND GIFFORD CO.
WORCESTER, MASS.

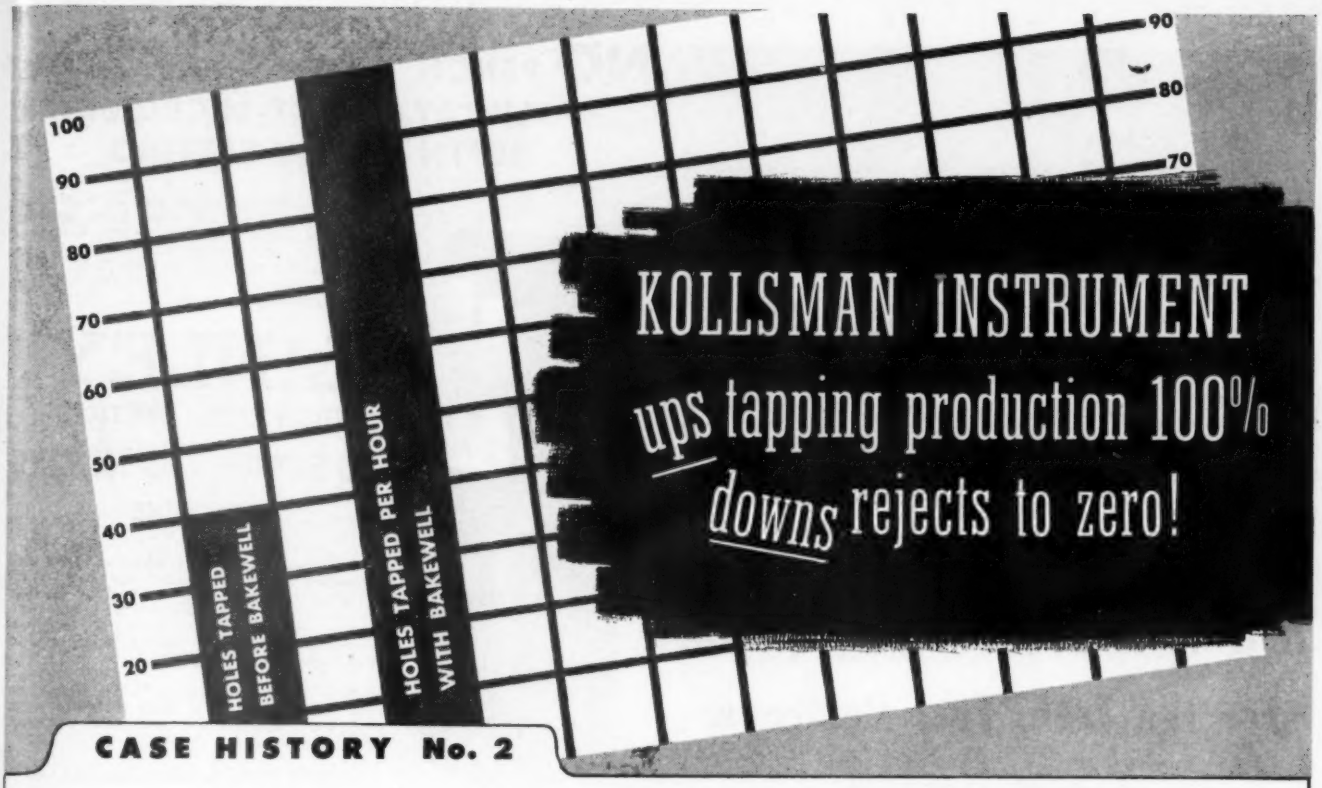
SPRINGFIELD GEARED HEAD LATHES



for peacetime or war production!

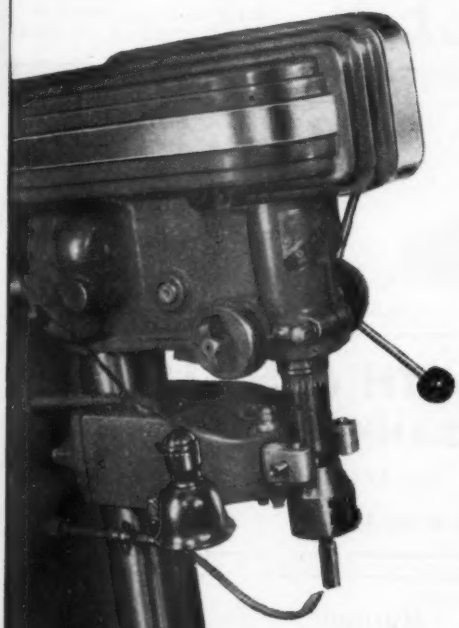
A lathe purchased now, for round-the-clock war production, must still meet peacetime requirements. Therefore, specify SPRINGFIELD lathes —flexible, efficient, ideal for emergency or normal production. SPRINGFIELD lathes are built in sizes from 14" to 30". Write for descriptive bulletins, prices, deliveries, etc.

The SPRINGFIELD MACHINE TOOL COMPANY • • • SPRINGFIELD, OHIO, U.S.A.



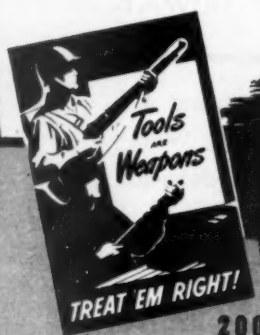
KOLLSMAN INSTRUMENT ups tapping production 100% downs rejects to zero!

CASE HISTORY No. 2



The second of a series of actual case histories from records of Bakewell Tapping Machine users.

FIRM: Kollsman Instrument Division
TAPPING MACHINE: Bakewell No. 1.
PIECE TAPPED: Case for sensitive altimeter
MATERIAL: Aluminum die casting
SIZE OF TAP: 1/8" pipe
NO. HOLES TAPPED PER HOUR WITH BAKEWELL: 100
NO. HOLES TAPPED PER HOUR BEFORE USING BAKEWELL: 40
PERCENTAGE OF REJECTS WITH BAKEWELL: 0
PERCENTAGE OF REJECTS BEFORE USING BAKEWELL: 5
REMARKS: Machine permits continuous operation of tap leaving operator's hand free to feed cases as rapidly as speed of tapping will permit.



BAKEWELL
Manufacturing Co.

2009 SANTA FE AVE., LOS ANGELES 21, CALIF.

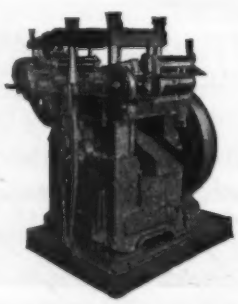
OFFICIAL U.S. NAVY PHOTO

H & W Is Producing Equipment For the Trim, Fast Destroyer Escort Vessels

Our greatly augmented capacity has enabled us to add to Dieing Machine production, the manufacture of a number of precision items, for example, the production of pumps for the Destroyer Escort program. Other current work includes aircraft items, Diesel engines, special machines, turbines and various sub-assemblies.

If you desire to sub-contract work of this type, we offer you exceptionally attractive facilities and service.

DIEING MACHINES MAKE ORDNANCE ITEMS



Famous for its ability to produce intricate stampings complete per stroke to high precision, the Dieing Machine is made in capacities of 10 tons to 300 tons.

REQUEST CATALOG 43

THE HENRY & WRIGHT MFG. CO.
487 Windsor Ave. Hartford 1, Conn.

Henry & Wright
AUTOMATIC MACHINERY
DESIGNERS & BUILDERS

NO PENCIL ERRORS . . . WITH LINLEY DIRECT MICROMETER DEPTH GAUGE SETTING

A lot of valuable time can be wasted in scheduling important little jobs on machines of higher rated capacity. Consider your past and present experiences in die work, metal patterns, models, jigs, small fixtures, etc., and see if it wouldn't be far more profitable to install a

LINLEY
HIGH SPEED VERTICAL
JIG BORING AND MILLING
MACHINE

Features include: a direct-reading micrometer depth gauge that prevents pencil figuring errors; a choice of eight spindle speeds—one for every need; counterbalanced quill to remove backlash; rugged, compact construction for a minimum of floor space (18½" x 20").

This little "machinists-helper" can be the busiest unit in a busy toolroom. It's fast, accurate and a real money-maker. You will want full details.

WRITE TODAY FOR ILLUSTRATED BULLETIN

LINLEY BROTHERS COMPANY
664 State Street Extension
BRIDGEPORT 1, CONN.

LUCAS "PRECISION"
Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.

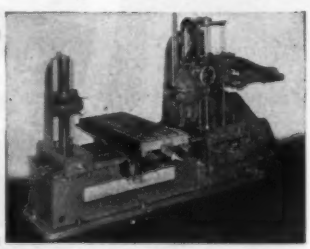
NOW AND ALWAYS OF

CLEVELAND
OHIO, U. S. A.

SMITH & MILLS
CRANK SHAPERS
sizes 12" to 32" stroke
THE SMITH & MILLS CO. Cincinnati, Ohio

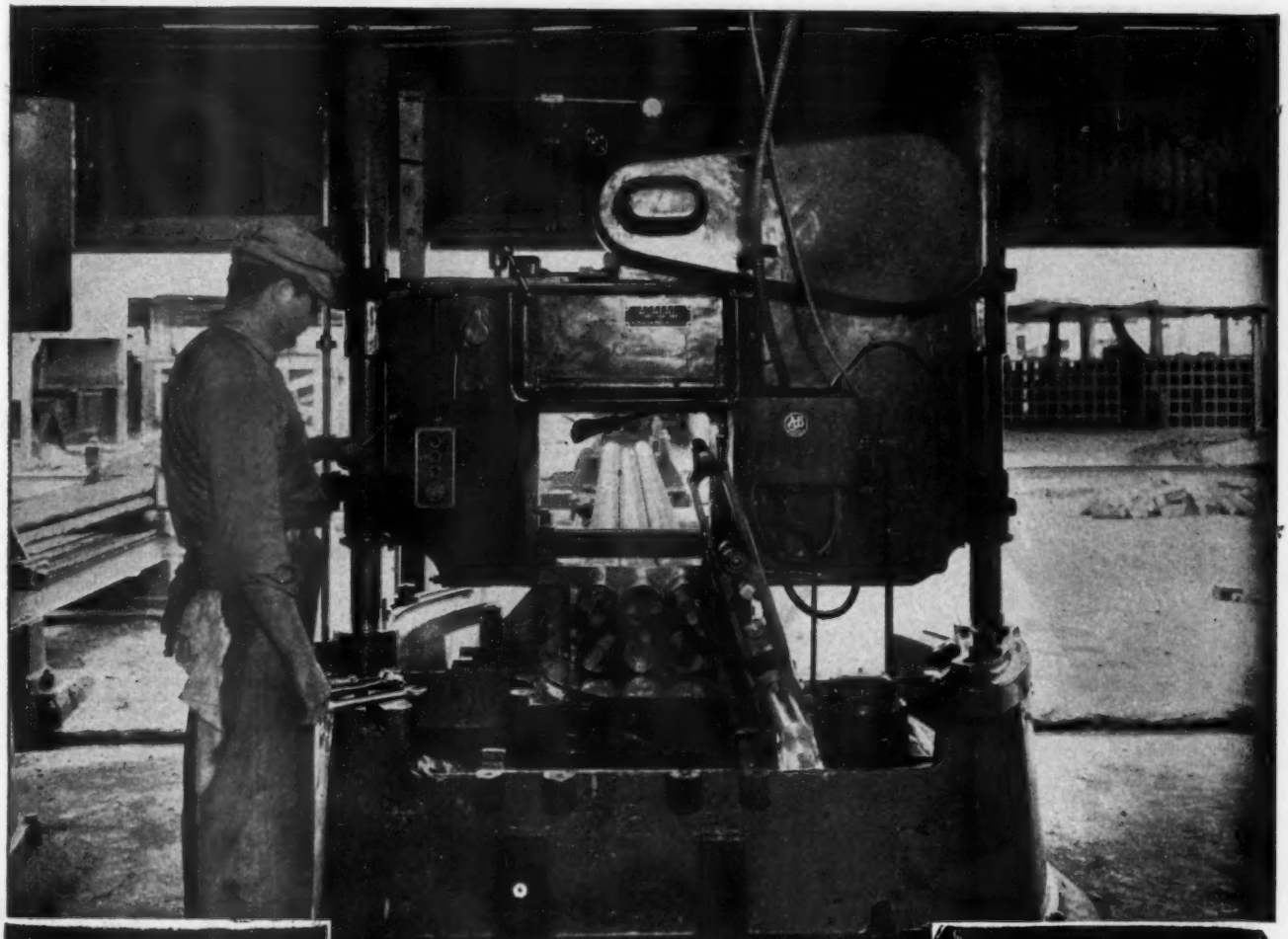
UNIVERSAL *Horizontal Boring Machine*
The only TRIWAY *Boring Machine Built*

Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.



Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.
Hudson, Mass., U. S. A.



MARVEL SAWS

Cut anything that will go between the jaws

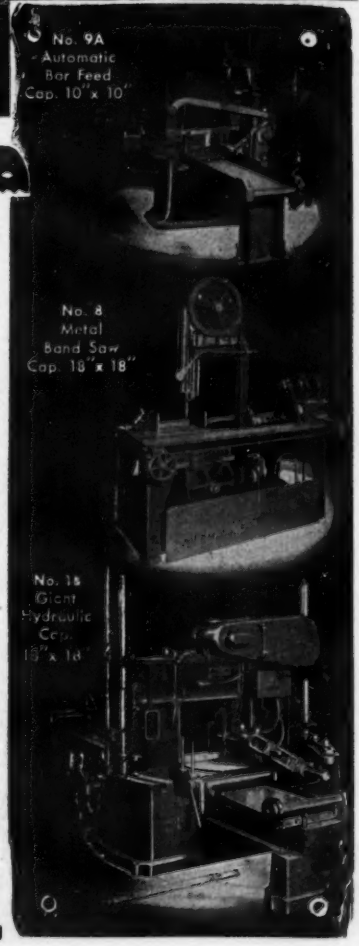
This is one of five No. 18 MARVEL Giant Hydraulic Hack Saws used by a well known Texas tool company to cut-off "multiple bars of alloy steel in round, square, and flat shapes, up to the maximum capacity of the large work-throat (18" x 18").

These super hack saws are designed for the largest sizes, and toughest steels—up to 18" x 18". After a year's heavy duty service, when asked as to the effectiveness of these saws in solving the cutting-off problems at this plant, the mechanical engineer in charge reported them "very effective."

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago, U. S. A.
Eastern Sales Office: 225 Lafayette St., New York



SPEED CASE STEEL

A LOW CARBON OPEN HEARTH PRODUCT

A Steel Knot

ONE STEEL

that gives you . .

1. High Speed Machining
2. Greatly Increased Tool Life
3. Smooth Finished Parts
4. High Physical Properties
5. Excellent Impact Resistance
6. Good Torsional Values
7. High Case Hardness
8. Great Core Toughness
9. Reduced Carburizing Time
10. Unusual Ductility
11. Minimum Distortion

ACTUAL PHOTOGRAPH
Speed Case Steel (.20 carbon) 1-inch cold drawn bar tied in a knot, cold; without fracture.

SPEED CASE STEEL . . .
CARBURIZES in less time with *High Case Hardness . . . Core Toughness* and *Minimum Distortion.*
WRITE US! *Our metallurgists are at your service.*

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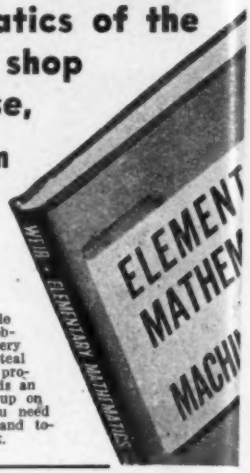
Licensor
MONARCH STEEL COMPANY
HAMMOND · INDIANAPOLIS · CHICAGO
PECKOVER'S LTD., Toronto, Canadian Distributor

Licensee for Eastern States
THE FITZSIMONS COMPANY
YOUNGSTOWN, OHIO

Now — the essential mathematics of the machine shop *in concise,* simple form

Just out!

Don't let the simple mathematical problems you meet every day in your work steal precious minutes of production time. Here is an easy way to brush up on the mathematics you need —a simple, brief, and to-the-point math book.



This book includes all the elemental mathematics the average machinist needs, giving only that work which is of prime importance, leaving out non-essentials. Starting at the very beginning with arithmetic, it takes you through enough algebra, geometry, and trigonometry to handle shop work successfully. Emphasis is on the jobs you meet daily in your work—calculations of cutting speeds, reading measuring tools, calculations involved in everyday use of machine tools. Practice problems are taken right from the machine shop.

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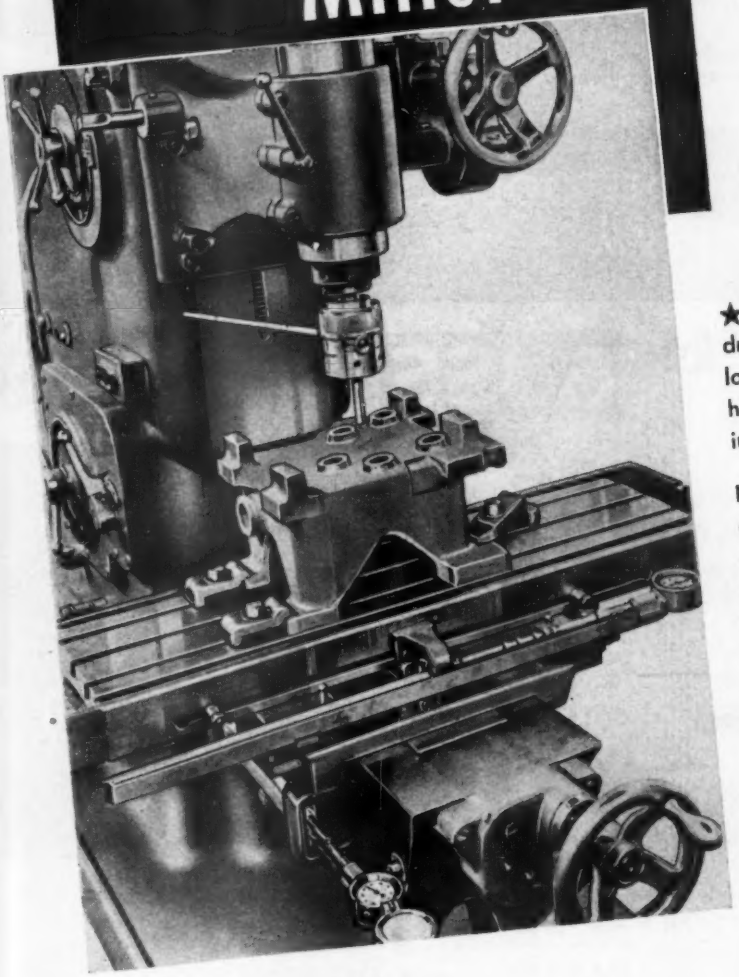

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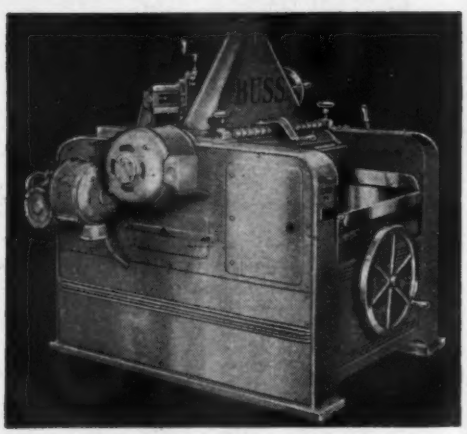

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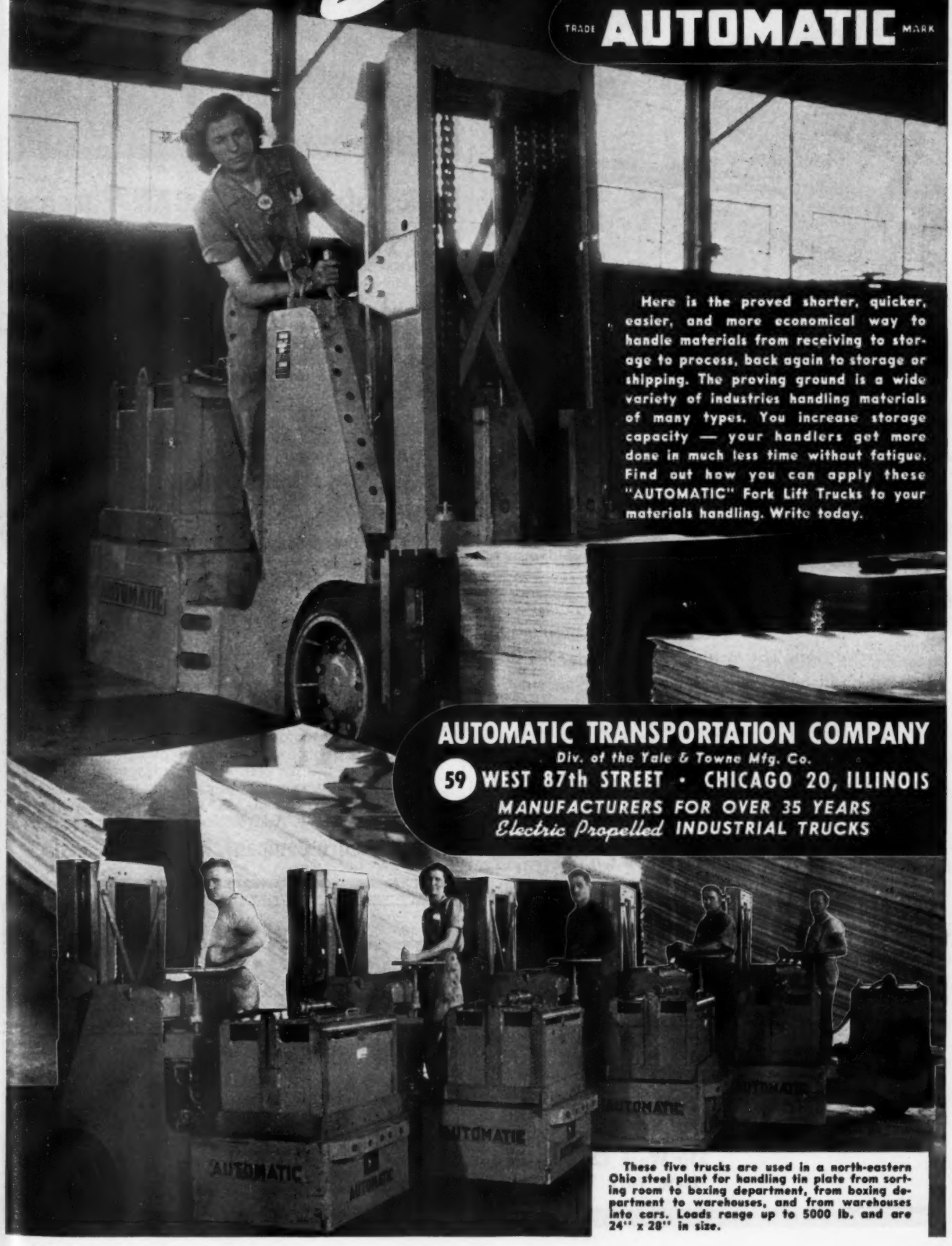

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These five trucks are used in a north-eastern Ohio steel plant for handling tin plate from sorting room to boxing department, from boxing department to warehouses, and from warehouses into cars. Loads range up to 5000 lb. and are 24" x 28" in size.

In a Post-war World

We desire to keep our plant in full production, and to provide work for our brave fighting men when they return. If you have ideas, inventions, or a product involving forging, heat treating, or machining . . . let's work together!

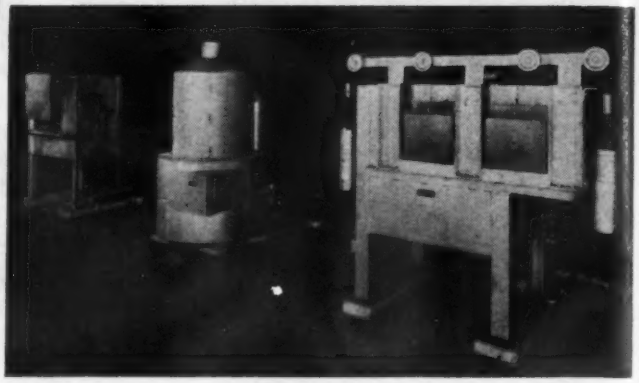
We are an old established firm, fully equipped to handle small and large drop forgings and upsetting operations. We are now on a 100% War Production Basis, but we are looking toward post-war conditions to keep our plant in full production to provide more jobs for the boys returning. We are in a position to carry on research, designing, manufacturing, and marketing, and, we have an enviable reputation for developing several patented articles on which we are paying handsome royalties.

So we extend a cordial invitation to forward looking men in our, and allied industries, to consult with us on post-war product developments. Let's keep American ingenuity employed at a full time wage.

For obvious reasons, it is necessary to have all communications addressed to the private box, given below. Your communications will be treated confidentially, as well as any interviews that may follow.

Please Address

ALL COMMUNICATIONS
TO BOX W-694
330 West 42nd Street
New York 18, N. Y.



Series of Three VULCAN Furnaces

for shaping, hardening and tempering tools and small parts. From left to right: A forging and tool dressing furnace, used for shaping hand and machine tools; a pot type furnace for quenching high speed steel in salt, hardening carbon steels in salt or lead, and carburizing in salt; a double chamber high speed steel and carbon steel heating furnace, with left chamber capable of 2350°F., and right chamber used for preheat at 1700°F. Can be equipped with muffler and carbon blocks for clean hardening. All furnaces are designed to permit quick raising or lowering of temperatures to meet various requirements. VULCAN Furnaces of the types shown may be of any size, and either oil, gas or electrically heated.

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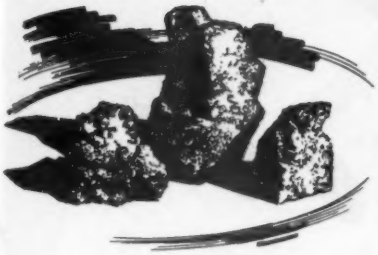
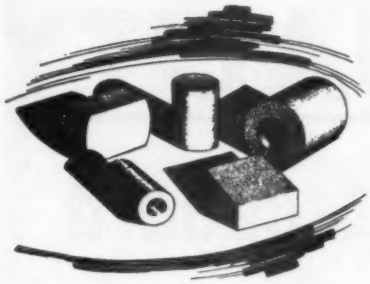


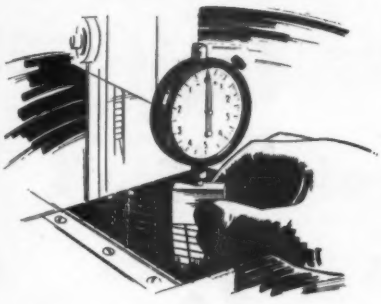
WHAT IS BORON CARBIDE?

Boron carbide (B_4C) is boric acid and coke combined in an electric furnace at approximately 5,000 degrees Fahrenheit. It is the hardest material ever produced by man for commercial use. Boron carbide is so dense that it can be lapped to a perfect mirror finish.



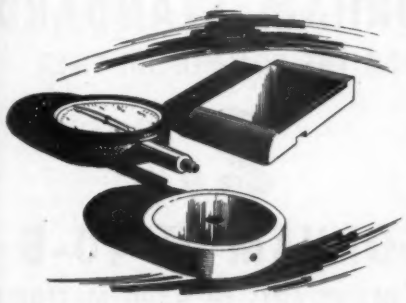
HOW IS IT FABRICATED?

Boron carbide is sintered into many shapes by molding in dies under high temperature and terrific pressure. These shapes include tiny bars and pellets, as well as larger cylinders, blocks, etc. They must then be worked with diamond wheels and powder until the desired forms, tolerances and finish are obtained.



WHAT ARE ITS ADVANTAGES?

Boron carbide is non-metallic, therefore it will not charge. It will not pick up lint, dust or metal particles. Thus these common trouble-makers are not present to scratch the work. Tests show that wear parts tipped with boron will not only outwear other materials, but offer outstanding economies as well.



WHERE CAN IT BE USED?

Boron carbide can be tipped on wear parts in place of many hardened steel, tungsten carbide and diamond applications where impact strength is not a factor. New England Carbide Tool Company has had wide experience in fabricating — to exact tolerances — thousands of boron carbide contact points and anvils for measuring instruments, wear parts, surface plates, etc. Therefore, it will pay you to take advantage of this experience when investigating boron carbide for your own use. Mail the coupon today for latest folder.

ALL KINDS OF CARBIDE PRODUCTS • DIAMOND TOOLS • DIAMOND POWDER

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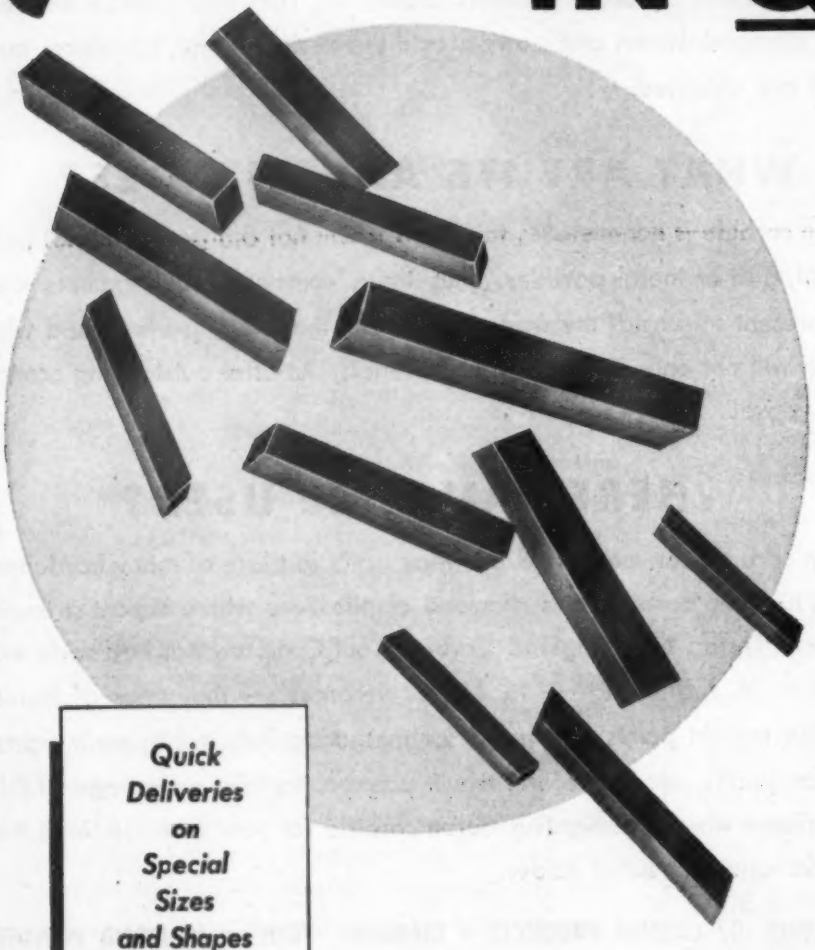

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How cutting oils and coolants can help *

SUBSTITUTE METALS for scarce alloy tools may help provide enough tools to "go around" in war-busy plants. There is no substitute for tool care to make these tools last long enough to finish the job.

WPB's nine rules for tool care are all important. Point six, particularly—"Keep Tools Lubricated and Cooled—nothing will damage tools more quickly than operation without proper lubrication and cooling."

It is not enough to select cutting fluids that merely prevent tools from burning or tearing the work. The right coolant and proper application can add hours between tool changes, save excessive grinding and loss of tool stock, and give better finish and accuracy. These simple suggestions may help you give your tools a longer and more productive life.

1. Select the right cutting fluid. There is no simple formula for selecting the best cutting fluid for a particular job. The requirements for each job must be carefully analyzed as to the type of tool used—metals to be machined—cutting feeds and speeds—finish and accuracy required. With all of these facts, and a complete knowledge of cutting oil qualities, the cutting fluid requirements on any job can be determined without a great deal of trial and error.

You can eliminate the errors and many trials by discussing your problems with one of our Cutting Oil Specialists. His experience in other plants with similar problems will save making many experiments. His knowledge of products recently developed for these new problems will be invaluable.

2. Apply it in the right places. What cutting fluid you use is no more important than where and how it is applied. Flooding the tool and work is important for cooling action. There must also be a sufficient volume of fluid to reach the point of contact of tool and work. Operators should be cautioned to return the coolant stream to the most effective position after changing tools or work.

3. Keep it clean. Cutting fluids are subjected to considerable contamination. Metal particles should be removed at regular intervals by cleaning out the machine, or by filtering or centrifuging the oil. Coolant lines should be kept free from deposits by using soluble oils which form stable emulsions. Oils are available which do not become rancid or develop strong objectionable odors. Make this an important consideration in selecting cutting oils.

A Standard Cutting Oil Specialist will have many more suggestions for helping you conserve tools through the use of better cutting oils and coolants. Call any Standard Oil Company (Indiana) office, or write 910 S. Michigan Ave., Chicago 5, Illinois, for this service. In Nebraska, call any Standard Oil Company of Nebraska office.

WPB's Nine rules of tool care

1. Put your tools away. Tools are weapons; they must be kept sharp.

2. Change bits *before* they get too dull. You can work faster, better with a sharp tool.

3. Keep rocker rest flat with shims. Your tool point takes a better bite when the tool rest is flat.

4. Put blocks close—clamp work tight. If blocks are too far apart, work is springy, may snap drill. If clamps are loose, work may turn and hurt you.

5. Look out for point of drill. Adjust tool stop so point won't be damaged by the harder backing plate. Don't let drill point hit table when removing.

* **6. Keep tools lubricated and cooled.** Nothing will damage tools more quickly than operation without proper lubrication and cooling.

7. Fit cutter snugly and evenly on arbor. If you force or pound the cutter on, it won't run true.

8. Keep yokes close to cutter. Otherwise you will get chatter and runout.

9. Keep spacing collars clean and parallel. Drunk milling cutters wobble, causing runout.

Oil is Ammunition... Use it Wisely

Standard Oil
CUTTING OILS and COOLANTS

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

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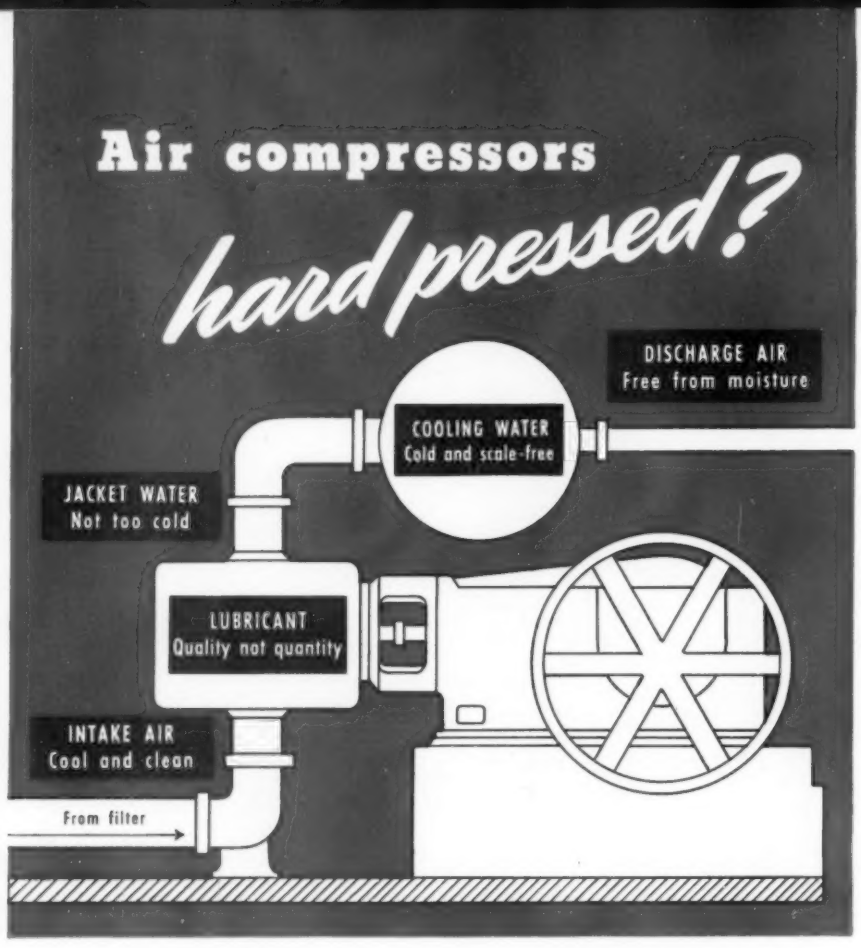


Here are some suggestions to help keep them out of trouble

CONDITIONS under which compressors operate, particularly under today's heavy loads, tend to cause excessive deposits. Improper lubrication is not always responsible for these deposits, but a compressor lubricant with the right qualities can reduce or eliminate many of them. The causes of some of the more common compressor operating problems and suggested cures are listed here:

Unstable Oils. Oxygen in the air and heat generated by compression tend to oxidize conventional oils, causing the formation of carbon and asphaltic substances which deposit on valves.

Keep intake air temperatures as low as possible. Be sure inter-coolers and after-coolers are supplied with an ample flow of cold water to keep air temperatures as low as possible. Keep this equipment clean and free from scale and rust. Use Stanoil from which the unstable hydrocarbons—those affected by heat and oxygen—have been removed, eliminating many troublesome deposits at the source.

Dirty Intake Air. The enormous volume of air required by compressors, particularly under heavy load, may introduce a large quantity of dirt and dust.

Be sure conditions have not changed which might increase such contaminants in the intake air in your compressors. Use efficient air screens and keep them clean. Use Stanoil which resists the formation of gummy deposits that might collect dirt and dust from the air and add to deposits on valves.

Condensation in Cylinder. Cooling water temperatures are extremely important. If water supplied to the cooling jacket is excessively cold, it will cause moisture in the compressed air to condense. This will wash off the lubricant film and cause excessive cylinder wear.

Preheat jacket cooling water by running it through the inter-cooler, or reduce the flow so that the temperature of the water when it leaves the water jacket is not below 100° F.

Condensation in Inter-coolers. Water in the inter-cooler should be cold enough to condense the oil and moisture in the compressed air, so that they can be removed before they enter the high pressure cylinder and cause excessive deposits.

Be sure an ample flow of cold water is supplied to the inter-cooler. Drain condensed oil and moisture from inter-coolers and after-coolers frequently if they are not provided with automatic outlets.

Over-Lubrication. Over-lubrication is the cause of much compressor trouble. In compressor operation, oil is not burned up as it is in internal combustion engines, nor is it washed away as it is in steam engines. Oil remains in the compressor cylinder a long time, and if it is of the right quality, very little is needed. An excessive amount of oil increases the possibility of deposits in valves, inter-coolers, and air lines.

Adjust oil feed to the minimum necessary to give an adequate film of lubricant on cylinder walls. Compressors usually require from one-fifth to one-tenth as much oil as steam cylinders of similar size. Because of the high lubricating quality of Stanoil, only a very small amount is needed to secure adequate lubrication.

Oil is Ammunition... Use it Wisely

STANOIL

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

Facts you should know

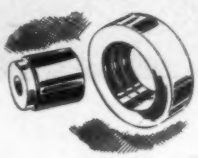
ABOUT TODAY'S CHROMIUM PLATING

THE CHANCES are that you already have an over-all picture of the many virtues of chromium plating . . . its extreme hardness, high resistance to chemical attack, unusual surface properties, etc., etc.

But very possibly you do not know all the ways in which these properties are being utilized in the war effort . . . the countless applications where one, two or several of the advantages of chromium plating have proved invaluable in stepping up production . . . improving performance . . . or saving priceless time and materials.

The facts here, of course, must be extremely brief, but complete information on each specific application is available both to our present licensees and to any interested manufacturer. Having pioneered in the chromium plating field, United Chromium makes available the results of years of research and development work — covering all the ramifications and possible uses for electro-deposited chromium.

INCREASING OUTPUT OF METAL-WORKING TOOLS

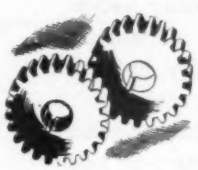


Chromium plating not only increases the life of many tools but often reduces stoppages and speeds output, as in the case of drawing and forming dies. Chromium plated drills are cutting more holes between sharpenings. On burnishing bars, chromium steps up production, produces a finer finish. These and many other tools are returned to service by rebuilding worn surfaces with chromium.

REDUCING WEAR ON CYLINDERS AND RINGS

Where equipment parts such as cylinders, piston rings and other parts of internal combustion engines are subjected to wear, and can utilize an oil-retaining type of finish — chromium plating having the proper degree and depth of porosity results in greatly improved performance. Large quantities of such parts are now being processed by our licensees to meet severest operating conditions.

SALVAGING PARTS AND PRODUCTION WORK



By chromium plating parts which have been machined off-size, many plants are reclaiming rejects — saving the metal as well as man-hours of labor represented in each piece. Successful applications of chromium for salvage include: — cylinders, pistons, axles, drive shafts, gears, valves, ball and roller bearing parts, and many types of taps, dies, jigs, fixtures and gauges.

PROTECTING PRECISION OF EQUIPMENT PARTS

Where maintenance of dimensional accuracy is essential to smooth operation and precision work, many manufacturers make it standard practice to apply a deposit of chromium on such parts as: — feed screws, shafts, cylinders, piston rods, pivots, cams, eccentrics, landing gear struts, etc. Chromium combines extreme hardness with a low coefficient of friction which reduces wear and prevents scoring.

UNITED CHROMIUM TECHNICAL ADVICE ASSISTS LICENSEES TO:

1. **Obtain installations properly designed for specific requirements.**
2. **Put installations into prompt production.**
3. **Meet strictest specifications.**
4. **Conserve metals and materials.**
5. **Utilize manpower more efficiently.**
6. **Eliminate possible plating bottlenecks.**
7. **Reduce waste due to rejects.**
8. **Lower over-all plating costs.**

IF YOU have any questions about the applicability of chromium plating in connection with your work, please write United Chromium, outlining your problem. Also send for our helpful booklet "The Last Thousandth of an Inch" containing further suggestions on how Chromium Plating can be used.

UNITED CHROMIUM
INCORPORATED
51 East 42nd Street, New York 17, N. Y.
Waterbury, Conn. ☆ Detroit, Mich.

These 2 will get you 4!

4 lathe operations with 1 set-up

Invest in this new production team—Specialties Cross-Slide Turret and Lathe Stop—and increase the productive capacity of your lathe. Cut machining costs, too.

Specialties Cross-Slide Turret holds four tools and permits four operations on one lathe with little increase in machining time. It's easy to operate. Merely flip turret, clockwise or counter-clockwise, from one index position to another. A clamp lever locks it in position.

Specialties Lathe Stop is a great time saver when performing multiple operations. Once the four measuring positions are set it is only necessary to index. After that it does the measuring for you. The index pin automatically centers and locks spacer arm to insure accuracy.

Mail the coupon below for further information about this great production team. This pair has what it takes for you to turn out more war material in less time.

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Please send me full information on SPECIALTIES lathe accessories.

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Adjustable REAMERS

* SIMPLE Wide Range Readjustment

EASE of adjustment is one of the many performance features that have made Wetmore tools the best buy in metal-working plants all over the country.

With Wetmore inserted-blade adjustable Reamers, blades may be set out 7 to 50 times, depending on the size of the reamers. Adjustment ranges from .034" on 5/8" diameter reamers to .420" on 3-7/16" sizes and larger. This feature saves time and tool cost. Wetmore Boring Bars can be accurately set to the thousands of an inch in a jiffy, even with inexperienced help, by means of the graduated adjusting screw.

The combination of design features found in no other Reamers and Boring Bars enables Wetmore tools to take faster and larger cuts . . . maintain close tolerances . . . produce absolutely smooth holes . . . and last longer. These features add up to lower machining costs and less spoilage.

STOCK DELIVERY

Wetmore standard Reamers are now available from stock for quick delivery; and unusually good delivery is made on boring bars and special tools. Phone, write or wire.

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MILWAUKEE 8, WIS.

You Can Speed Your Production With This Wade Precision Lathe

WADE No. 8-A
TOOLMAKERS' PRECISION LATHE SPECIFICATIONS

Length of Bed	44"
Distance between Centers	24"
Swing over Bed	8½"
Swing over Cross Slide	5½"
Swing over Compound Slide	2½"
Size of Tools	⅜" x ¾"
Cross Slide Travel	5"
Tailstock Spindle Travel	3¼"
Compound Slide Travel	2½"
Collet Capacity	1"
Taper Standard for Centers	No. 2 Morse
Width of Driving Belt	1¼"
Clear Hole through Spindle	1 3/16"
Spindle Nose, Hardened and Ground Threads	2" x 10 TPI
Height above bench to center line of Spindle	12"
Weight, net	1075 lbs.

Wade

Bench Lathes and Profilers For Precision, Versatility And Stamina

You can speed your production with this Wade No. 8-A Toolmakers' Precision Lathe because it is precision-built for precision work . . . enabling your men to work faster, with greater accuracy and with less spoilage.

All control and operating features are carefully worked out for efficient handling of the work. These close tolerances are possible: Thread cutting operations: Overall error in lead will not exceed plus or minus .0005" per foot. General turning operations: Accuracy within .0003" over distance of any one foot. Facing: Will check within .0002" concave and .0000" convex on an 8" face. You can depend on Wade Precision Lathes for precision, versatility and stamina.

Write today for catalog

THE WADE TOOL COMPANY

WALTHAM 54, MASSACHUSETTS

LATROBE

High Carbon · High Chrome
DIE STEELS

COBALT CHROME
AIR HARDENING

GSN SPECIAL
AIR HARDENING

GSN
OIL HARDENING

FOR MAXIMUM PRODUCTION RUNS

TYPICAL ANALYSIS

	C	Si	Mn	Cr	V	Mo	Co
GSN Oil Hardening	2.20	.50	.50	13.20	—	—	—
GSN SPECIAL Air Hardening	1.50	.30	.30	11.50	.30	.70	—
COBALT CHROME Air Hardening	1.35	.50	.25	12.50	—	.70	3.00

These steels are playing their part in making possible the vast production of war materiel. They help provide the Dies, Punches, Gauges and many other precision tools that must produce and keep producing the countless parts that go into our planes, ships, tanks, guns and ammunition.

One of our service engineers can help you determine which of these essential Latrobe Steels will best meet your requirement, thus assuring you of *maximum production runs!*

TOOL STEELS FOR VICTORY

LESCO

Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES *and* PLANT · · LATROBE · PENNSYLVANIA

"SCREWBALL" *can't be bothered with speeds*

"SCREWBALL" never was good at arithmetic and believes in letting well enough alone—so never changes threading speed.

ROUGH THREADS because a stock requiring low threading speed is run too fast, or wasted time because an easy-threading stock is run too slow.

This is one of a series of Educational cartoons on threading. If you are interested we will be glad to mail them without obligation.

SEND FOR THIS NEW SPEED CALCULATOR— *it thinks for you*

SCREW MACHINE FOREMEN, SET-UP MEN, PRODUCTION ENGINEERS will appreciate the convenience this figure-saving index provides. Reverse side gives an up-to-date table of Suggested Speeds for Threading and Turning 63 SAE and NE Steels including Stainless and 18 Other Materials, Non-Ferrous, Plastics, Rubber, etc.

ELIMINATES FIGURING! Find the Surface Feet for Threading on the table, then turn the disc until Diameter of Stock appears under arrow (A for inches or decimals, B for millimeters). Read the Spindle Speed RPM opposite Surface Speed. Do the same for Turning. Opening C gives Production per hour for the number of seconds it takes to make one piece.

SPEED CALCULATOR
SURFACE SPEED FEET PER MINUTE
SPINDLE SPEED REVOLUTIONS PER MINUTE
H & G INSERT CHASER DIE HEADS
THE EASTERN MACHINE SCREW CORPORATION
142 BARCLAY STREET, NEW HAVEN, CONN.

Send 15¢ to cover cost of printing and postage

H&G DIE HEADS *With* INSERT CHASERS

THE EASTERN MACHINE SCREW CORPORATION
21-41 Barclay Street • New Haven, Conn.

A 3-PLUNGER PUMP *with EXTRA Performance*

Result of Elmes' 92 Years Experience Designing Hydraulic Equipment

Possesses Greater Efficiency, Power, Versatility . . . to Help Meet War Production Schedules

Choose this pump to operate a press; to power an accumulator. You can depend on it to give efficient, economical *extra* performance.

Scientific design gives it extra power. Precision construction gives it extra smooth operation. Choice of quality materials plus skilled workmanship give it extra long life. The combined features, listed to the left, make it an outstanding piece of hydraulic equipment . . . a real profit-producer in any manufacturing operation.

Consult Elmes for all hydraulic equipment: pumps, accumulators, laboratory presses, plastic molding presses, forming and forging presses.

THESE FEATURES MEAN EXTRA SMOOTH, ECONOMICAL, TROUBLE-FREE OPERATION

- New Lubrication System
- Forged Steel Body
- Hardened and Ground Pistons
- Winged-Type Valves
- Anti-Friction Bearings
- Box Section Type of Frame
- Gear and Pinion Totally Enclosed

ELMES ENGINEERING SERVICE . . . AT YOUR SERVICE

Elmes Engineering Staff will help you in the selection or design of efficient hydraulic equipment. Suggestions, recommendations, with cost estimates gladly given without obligation.

ELMES ENGINEERING WORKS of AMERICAN STEEL FOUNDRIES, 1001-1013 Fulton St., Chicago

ELMES HYDRAULIC EQUIPMENT

Also Manufactured in Canada

METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES

In at the finish—"MX" WHEELS

. . . AND IT'S THE FINISH THAT'S IMPORTANT!

IN at the finish of innumerable industrial operations these days is the versatile "MX" Wheel, introduced by Carborundum, only a little over a year ago. Their function is to remove "disturbed metal" such as the burrs and tool marks which result from grinding, machining, boring and similar operations.

"MX" Wheels are made up of abrasive grains intermingled with cotton fibres and held together with a suitable binder. They are unlike any other abrasive product made. They are free and clean cutting and are used without coolant. They are resilient and have a cushioning effect which makes them tend to hug the work. Chatter and vibration are reduced. The result is a smooth finish so important in current manufacturing methods.

"MX" Wheels are ideal for breaking corners, removing burrs and polishing grooves and slots. Surrounding surfaces are kept free of abrasive marks. Tolerances are maintained in polishing because of the light stock removal.

Write to Dept. *AD*, The Carborundum Company, Niagara Falls, N. Y. for literature describing "MX" Wheels and their many uses.

Every hour this war is shortened will save $12,000,000. The lives it will save are priceless. Let's get it over with—quickly!

ARMY E NAVY

CARBORUNDUM
REG. U.S. PAT. OFF.
ABRASIVE PRODUCTS

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.
REG. U. S. PAT. OFF.

MANUFACTURERS OF GRINDING WHEELS, COATED ABRASIVES, SUPER REFRACTORIES, HEATING ELEMENTS

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and MX are registered trade-marks of and indicate manufacture by The Carborundum Company)

Official U. S. Army Signal Corps Photo

THERE'S A *New* HEAVY WEAPON ON THE CUTTING LINES, TOO - IT'S *Super DBL* HIGH SPEED STEEL

Available IN THESE FORMS

★ Hot Rolled and Forged Bars in all necessary sizes.

★ Ground Bars: rounds in sizes up to 3" dia.—polished, standard ground or rough ground finishes.

★ Hardened and Tempered Tool-Holder Bits in sizes from 3/16" to 1", packed in one or assorted sizes as needed. Also special sizes as may be required.

NOTHING NEW TO LEARN IN HEAT TREATMENT OR SHOP HANDLING

IN the M-12 Tank Destroyer, above, Army Ordnance has combined the great hitting power and range of the 155 mm gun with the speed and mobility of the medium tank chassis. The result is a weapon that not only can stop any enemy tank now or likely to be in the field, but can blast out land strong-points or sink a ship.

In similar fashion, Allegheny Ludlum technicians have added cobalt to the familiar AL-developed DBL low-tungsten moly analysis. The result, *Super DBL,* is a high speed steel of maximum red hardness for heavy duty work—a material that delivers top performance at the same time that it conserves strategic materials.

Super DBL has been thoroughly proved in service. Use it for your heavy roughing and "hogging" jobs—it's suitable for anything from hard, gritty materials to tough, heat-treated alloy steels. ● Full information is available in the *"Super DBL* Blue Sheet." Write for your copy, or for the assistance of our Mill Service Staff in selecting the proper grades of AL Tool Steels for your various production jobs.

ADDRESS DEPT. A.M.12

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

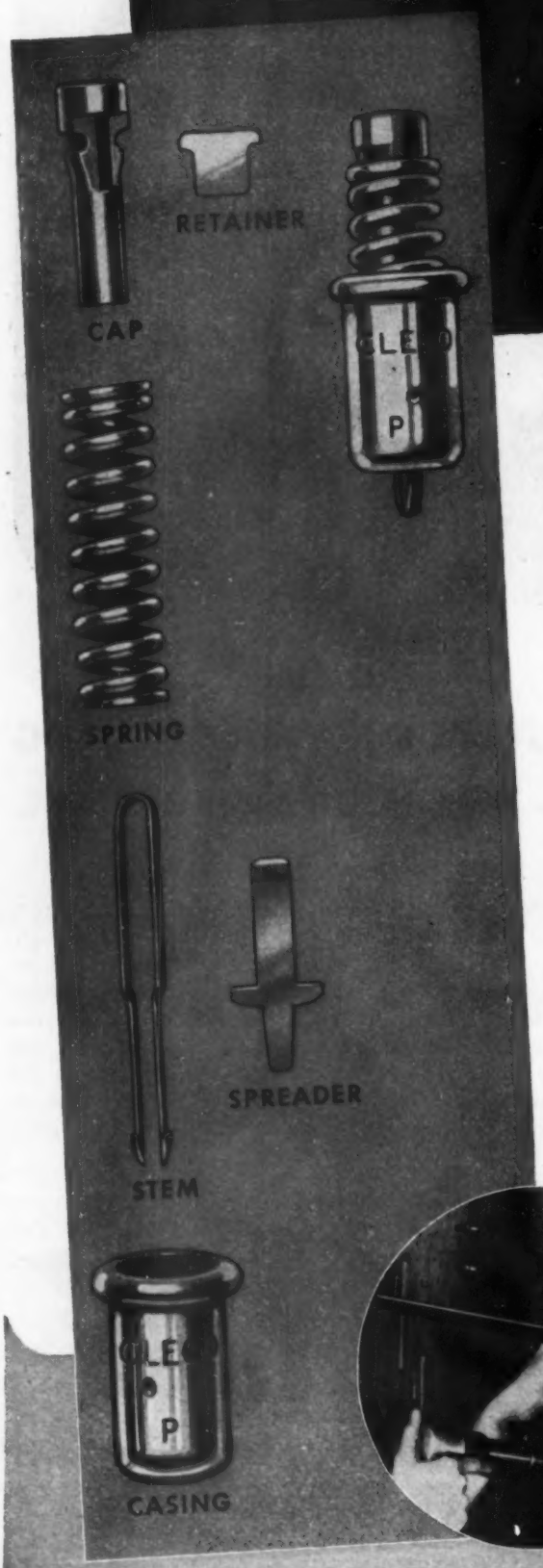
A-9075...W & D

NOW READY!

CLECO TYPE "P"

Triple-Safe

SHEETHOLDERS



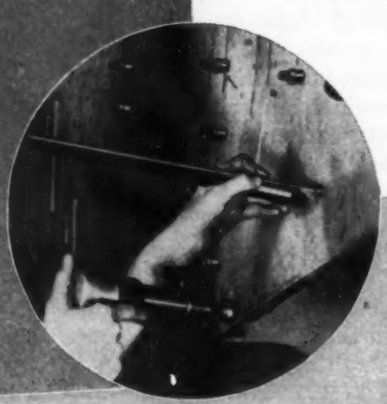
NOW offered by the original American manufacturers of quick fasteners for airplane skin, Type "P" Cleco's have the additional advantage that the parts will not "fly" if the stem breaks. Locked at 3 points, they are *triple-safe*. As in previous types, these Cleco's are repairable and each size is colored differently for quick identification. They can be handled with any style of pliers used in the past. CLECO pliers, always handy and compact, have now been improved further, and are the best obtainable.

Cleco Type "P" sheetholders can also be furnished with longer stems and spreaders for work requiring that a greater thickness be gripped. Standard unit holds thicknesses from 0" to 3/16". A longer stem and spreader combination holds thicknesses of 3/16" to 3/8". A still longer combination holds thicknesses from 3/8" to 9/16", and so on.

Type "P" sheetholders are available in sizes 3/32", 1/8", and 5/32". Parts are either pentrated (self lubricating) or plated —thoroughly rust-proofed. With required priority, shipment is surprisingly prompt. Send for Type "P" bulletin.

THE CLEVELAND PNEUMATIC TOOL CO.
3781 East 77th Street · Cleveland 5, Ohio
Branch Offices in all Principal Cities

BUY U. S. WAR BONDS AND STAMPS



• Teammate with Cleco sheetholders is the RIV-N-JECTOR, astonishingly simple and effective device for reducing rivet losses 90% in aircraft work. Ask for new Bulletin 89.

MORE BOMBERS, TANKS AND ARTILLERY REQUIRES *FASTER* PRODUCTION CLEANING!

These 2 NEW, FREE Oakite Manuals Give Time-Saving Techniques For Increasing Output!

You can expedite your production degreasing operations . . . make significant savings in urgently needed time and critical manpower . . by taking advantage of the recently developed techniques and materials described in these two NEW Oakite instruction manuals. Moreover, rejects will be drastically reduced and output increased!

Anodic Degreasing of Steel and Copper

This 16-page guide contains full directions on anodic degreasing to obtain the CHEMICALLY CLEAN surfaces so essential for durable, uniform plated or other finishes on steel and copper parts. Here you will find concisely described how OAKITE COMPOSITION No. 90 QUICKLY and THOROUGHLY removes smut, buffing and polishing compounds, machining oils, forming lubricants, grease and shop dirt from a wide range of war supplies before finishing operations.

Solving Special Cleaning Problems

Describing a versatile acid-type detergent, OAKITE COMPOUND NO. 84, this 12-page booklet gives valuable information for solving many special cleaning problems. Complete instructions are given for removing oxide film and light rust deposits from steel parts, de-tarnishing brass and copper, removing oxide and heat treat films from aluminum, cleaning before Alrok finishing and stripping anodizing film from aluminum work racks and rejects.

WRITE TODAY FOR YOUR FREE COPIES!

These informative guides are YOURS for the asking. Based on the successful experience of war plants the Nation over, the practical data they contain will HELP YOU solve many of your difficult production degreasing, cleaning and related problems! Write for your FREE copies TODAY!

OAKITE PRODUCTS, INC., 24 Thames Street, NEW YORK, N. Y.

Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE CLEANING

MATERIALS...METHODS...SERVICE

FOR EVERY CLEANING REQUIREMENT

give a man a tool he can trust

Abrasive RED BAND Diamond Tools

Skilled hands alone are not enough to assure the peak production essential to early victory. Soldiers of the production front must have tools they can depend on . . . to do *better* work, *more* work per set-up. This consideration leads the nation's industries to specify Abrasive, expertly engineered and produced by master craftsmen. Get acquainted with Abrasive for immediate as well as post-war production. Write for catalog and further details.

Third Generation of Diamond Experience

ABRASIVE DRESSING TOOL COMPANY • Detroit, Michigan

You can't teach an *Old Dog* new tricks

So says the proverb!

Yet, almost overnight, American shipbuilders—"old dogs" at their business—*learned* the entirely "new trick" of constructing steel cargo vessels and war vessels by welding. If they hadn't, the "bridge of ships" that made the conquest of North Africa and the invasion of Europe possible would still be just a pipe dream.

Contributing much to the shipbuilding industry's phenomenal production records is the "researched line" of **McKay Welding Electrodes,** a preponderance of which now goes into all-welded ship construction.

In addition to these **McKay Electrodes** of Stainless, Alloy, or Mild Steel for every welding purpose, **McKay Chain**—its production stepped-up more than 400%—plays a vital role in maritime uses; and **McKay Tire Chains** help maintain the efficiency of both civil and military transportation.

It's no "trick" to learn how the McKay line can speed *your* production schedule.

Simply write us!

GENERAL SALES OFFICES: YORK, PA.

THE McKAY COMPANY
PITTSBURGH, PA.

WELDING ELECTRODES . . . COMMERCIAL CHAINS . . . TIRE CHAINS

FASTER CUTTING

—The better cooling and lubricating job performed by Tycol Transparent Sulphurized Cutting Oil is effecting material savings in time and enables greater output even on the toughest of steels.

FINER FINISHES

—Tide Water Transparent Cutting Oil is unique among sulphur base cutting oils in that it does not tarnish the work. This important consideration led thousands of machine tool users to insist on Tycol.

LONGER TOOL LIFE

—Tools that work under Tycol Cutting Oil have a long useful life. Regrindings are cut materially and the problem of chips welding to the tool is minimized.

with TYCOL Cutting Oils

1,181% increase...

in taps per grind with TYCOL SOLUBLE OIL!

26,250 nuts sound like a lot of nuts, but 310,000 are over 11 times as many. And that's the difference in nut production, between tap grindings, Tycol 678 Sulphurized Soluble Oil achieved for one large manufacturer.

In identical machines, each flushed and equipped with new taps, one was replenished with Tycol 678, the other with a similarly priced oil, both in charge of one operator. During the first 21 working days the tap used with oil of equal price was ground 8 times, tapping 26,250 nuts per grind, and was worn out. The tap used with Tycol 678 was ground for the first time after 31 working days (10 days after its contemporary had failed completely), during which 310,000 nuts were tapped. Presumably the life of this tap will also be 8 grindings, during which it will have *tapped 2,480,000 nuts as compared with 210,000 for its teammate.*

This is not an isolated example. Reports roll in continually about more and better shell, bomb, gun barrel, and similar war production increases with Tycol Cutting Oils throughout the land. Let Tycol help increase and improve production and save man hours and tools for you. Call a Tide Water Engineer today for recommendations calculated to get maximum efficiency in each of your machining operations.

Principal Branch Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.
TIDE WATER OIL COMPANY OF CANADA, LTD. • Toronto — Montreal

TIDE WATER ASSOCIATED OIL COMPANY

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL • EASTERN DIVISION: 17 BATTERY PLACE, NEW YORK

DRUMS! DRUMS! DRUMS!

War needs make it extremely important that all empty drums be returned immediately

STELLITE HIGH-PRODUCTION CUTTING TOOLS
are Available for Prompt Delivery

Stellite "98M2" and "Star-J-Metal" tools are widely used for machining steel, cast iron, and most of the machinable materials. These dependable tools take heavy cuts at high speeds and heavy feeds—with long life between grinds. This means high production at low cost per piece machined.

The types and sizes in which each grade is available, the purposes for which each type is recommended, and the correct grinding wheels to use are shown in the descriptive price lists illustrated below. Copies of any of these price lists will be sent on request.

Stellite "98M2" tools (left) were developed specifically for machining steel, and are also excellent tools for use on brass, bronze, and cast iron. They are hard, tough, and possess good edge strength.

Stellite Star-J-Metal Tools (right) are used on many materials, including steel and cast iron, for a wide variety of operations —including turning, boring, facing, milling, reaming, grooving and forming.

Standard Tools in Stock

SOLID TOOL BITS—Square, flat, or round . . . wide range of sizes . . . finish-ground ready for use in standard tool holders. Easily converted to various profiles.

WELDED TIP TOOLS—A variety of styles and sizes for use where solid bits are impracticable.

MILLING CUTTER BLADES—For many cutter body types, including Ingersoll, Kearney & Trecker, Modern, Production, OK, and Continental.

WEAR STRIPS—Haynes Stellite alloy castings brazed to a mild steel base, for attachment to boring, driving, and pilot bars to assure accuracy and long life.

Special Tools to Users' Specifications

Many types of special Stellite tools are regularly supplied, cast and finish-ground to users' specifications. These include solid bits, welded tip tools, milling cutter blades, reamer blades, brazed-in blade shell end mills, form tools, boring tools, counterbores, spotfacers, and reamers.

STELLITE
Reg. U. S. Pat. Off.

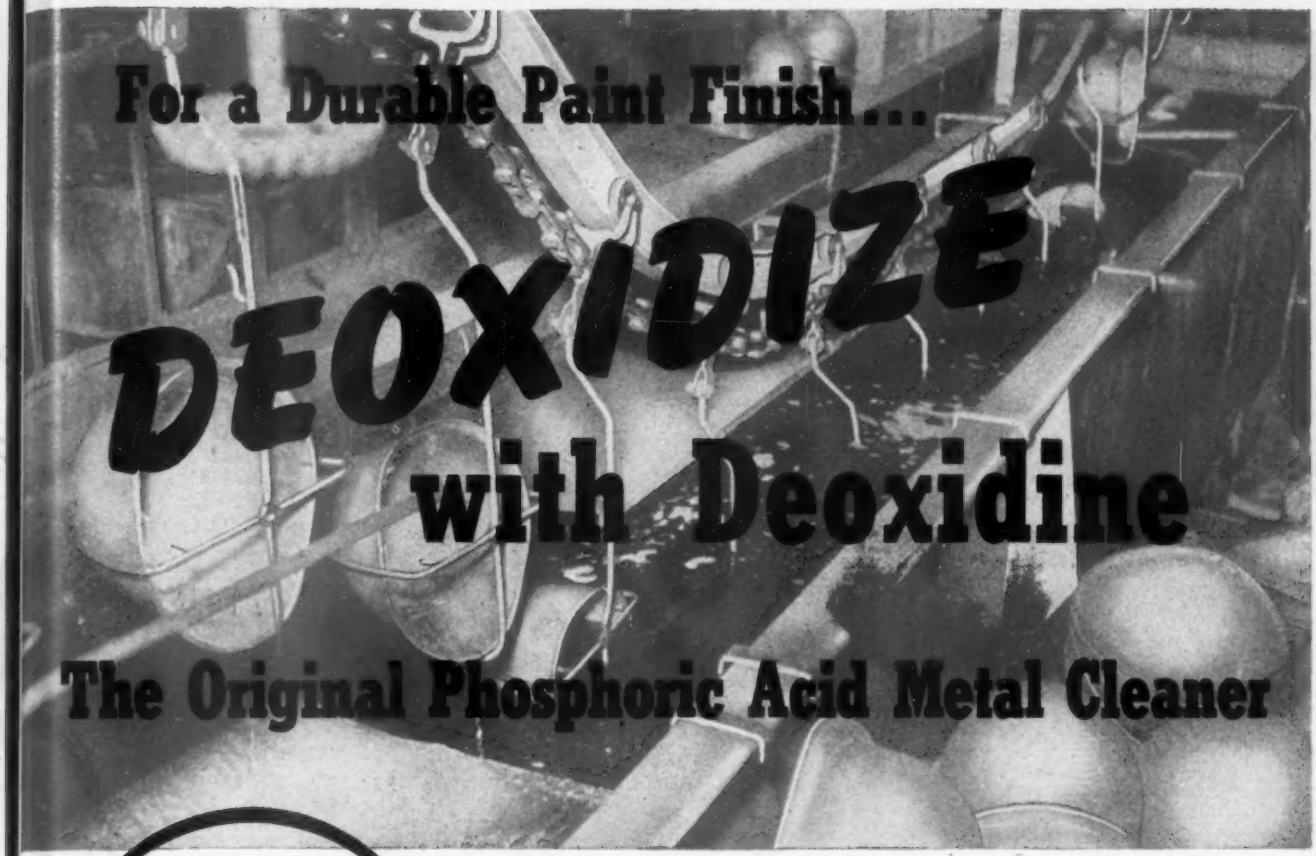
HAYNES STELLITE COMPANY
Unit of Union Carbide and Carbon Corporation

New York, N. Y. UCC Kokomo, Indiana

Chicago—Cleveland—Detroit—Houston—Los Angeles—San Francisco—Tulsa

• HIGH-PRODUCTION METAL-CUTTING TOOLS •

The words "Haynes Stellite," and "Stellite" are registered trade-marks.



Mechanized dip treatment of helmets in preparation for paint finish

ACP
Inhibitors and Metal Working Chemicals Speed Production of

GUNS
Mounts and Parts

AIRCRAFT and AUTOMOTIVE
Body Surfaces
Engines
Exhausts
Other Parts

MARINE
Structures and Parts

STEEL SHELLS and PROJECTILES
All Sizes

BOMBS
All Sizes and Types
and Many Other
Ordnance Parts

Deoxidine, a phosphoric acid type metal cleaner, removes rust and rust producers, light oil, oxides and annealing scale, from pits as well as from the surface of metal, *creating* a *chemically clean, slightly etched* surface—the ideal anchorage for enduring paint or lacquer finish. Deoxidine meets Army and Navy specifications for cleaning metal prior to painting.

There are various grades of Deoxidine adapted to the several methods of application and to cleaning surfaces with varying amounts of rust and oil.

The Deoxidine Cleaning process has been standard for more than a quarter of a century and is adapted to the cleaning of steel, aluminum, aluminum alloys, in fact all metals (except zinc and cadmium).

If you have specific cleaning problems and will send us detailed information, our Technical Department will gladly send you prompt advice and recommendations. Please fill in attached coupon.

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP **PENNA.**

Note: West Coast Plants may address inquiries and orders for prompt delivery to: Leon Finch, Ltd., 728 East 59th St., Los Angeles, Calif.

American Chemical Paint Company, Ambler, Pa.

Please send me general Technical Service Data Sheets on

☐ Deoxidine

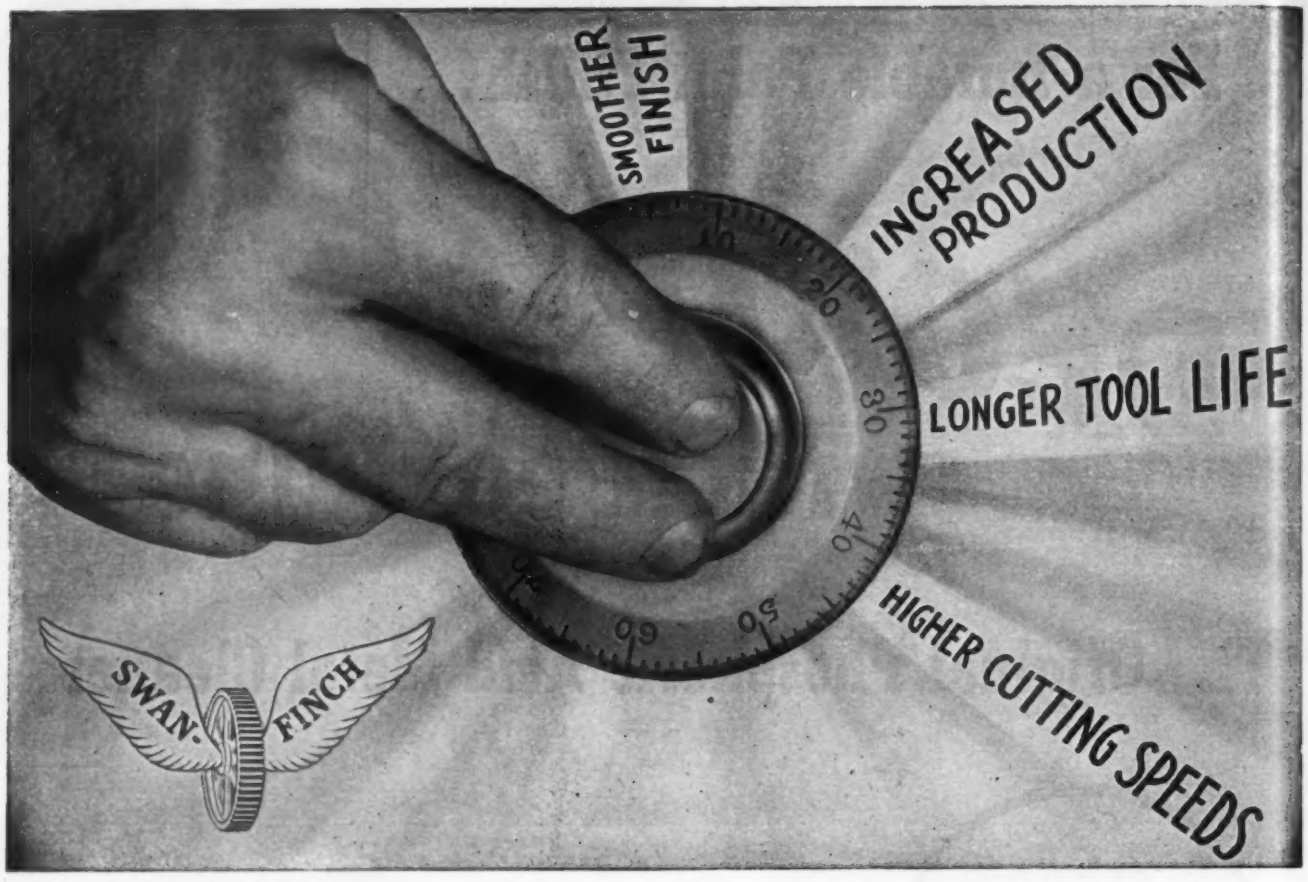
*Name*_____

*Title*_____

*Company*_____

*Address*_____

M-11



SAFCO METAL WORKING LUBRICANTS

Right Combinations for increased production!

Right combinations of ingredients in metal working lubricants are like the right numbers on the dial of a safe, each one vital for opening wide the doors of production.

Swan-Finch 'SAFCO' metal working lubricants are combinations that have been continuously proved as scientifically correct.

Today high production schedules and precision specifications do not permit guesswork.

Swan-Finch, the makers of 'SAFCO', are lubrication specialists in the metal working field.

That's why more important plants engaged in vital war production are testing and specifying 'SAFCO' lubricants.

It will pay you real dividends to get better acquainted with the Swan-Finch field representative who covers your district. Capable and able, they are constantly devising *new* ways and means for stepping up production.

For instance meet M. D. Scott. He is one of our highly trained and experienced staff of fieldmen.

ASK US TO HAVE HIM CALL—NO OBLIGATION.

SWAN-FINCH OIL CORPORATION

Offices		Plants	
New York City—Executive Offices	R.C.A. Building, West	Newark, N. J.	120 Lister Avenue
Chicago, Ill.	201 North Wells Street	Chicago, Ill.	5849 West 66th Street (Clearing, Ill.)
Detroit, Mich.	2596 Hart Avenue	Detroit, Mich.	2596 Hart Avenue

CUTTING TOOLS ARE *weapons*

The ability of cutting tools to produce to their maximum is as important on your production line as are weapons of death on the firing line.

Good cutting tools, properly sharpened and ground, should be as efficient throughout their life as they were when originally received from the manufacturer.

Illustrated here are simple instructions for sharpening and salvaging standard Counterbores. No particular trick or wizardry is required. Simply follow directions.

Reprints on request for posting in your Grinding Department

LAND or Primary Clearance—Be sure to maintain the 7-degree clearance angle indicated . . . this relieves and supports the cutting edge. Width of Land should be 1/32" on small, 1/16" on medium and 1/8" on large cutters. When width of Land is increased by sharpening, the Heel or Secondary Clearance should be reground.

HEEL or Secondary Clearance—For accurate and free cutting action, it is important to maintain the Heel or Secondary Clearance at the 29-degree angle indicated. This provides proper chip clearance (eliminates clogging) in the flute—reduces the material to be removed when grinding Land or Primary Clearance.

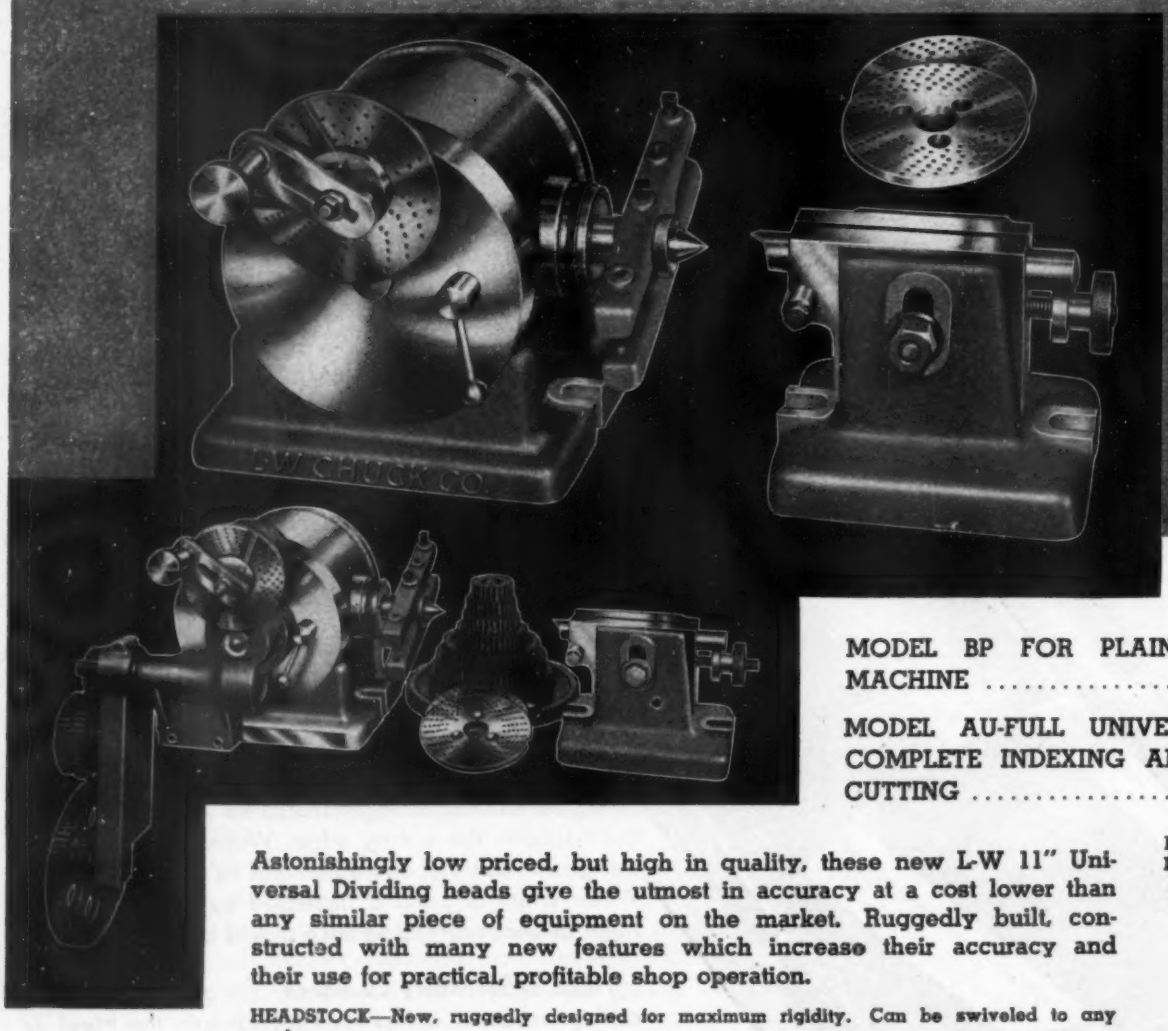
For best results use a soft, medium grade emery wheel—48 to 60 grain. Free hand grinding is not recommended. When excessive sharpening is necessary, keep the cutter **cool.**

THE GAIRING TOOL COMPANY, Detroit 32, Michigan

Gairing TOOLS

Manufacturers of Standard, Special and Gair-Lock Inserted Blade Cutting Tools

L-W UNIVERSAL DIVIDING HEADS



MODEL BP FOR PLAIN MILLING MACHINE $128.55

MODEL AU-FULL UNIVERSAL FOR COMPLETE INDEXING AND SPIRAL CUTTING $194.65

Immediate Delivery

Astonishingly low priced, but high in quality, these new L-W 11" Universal Dividing heads give the utmost in accuracy at a cost lower than any similar piece of equipment on the market. Ruggedly built, constructed with many new features which increase their accuracy and their use for practical, profitable shop operation.

HEADSTOCK—New, ruggedly designed for maximum rigidity. Can be swiveled to any angle.

TAILSTOCK—New design, heavier and stronger.

HEADSTRONG SPINDLE—Tapered bearings, bored for No. 10B & S Taper. Increased diameter and length. Threaded nose 2¼" diameter 10 thread USS.

WORM—Made from special alloy steel, accurately finished, end thrust taken by ball bearings. Means are provided to make adjustment of worm wheel easily and accurately.

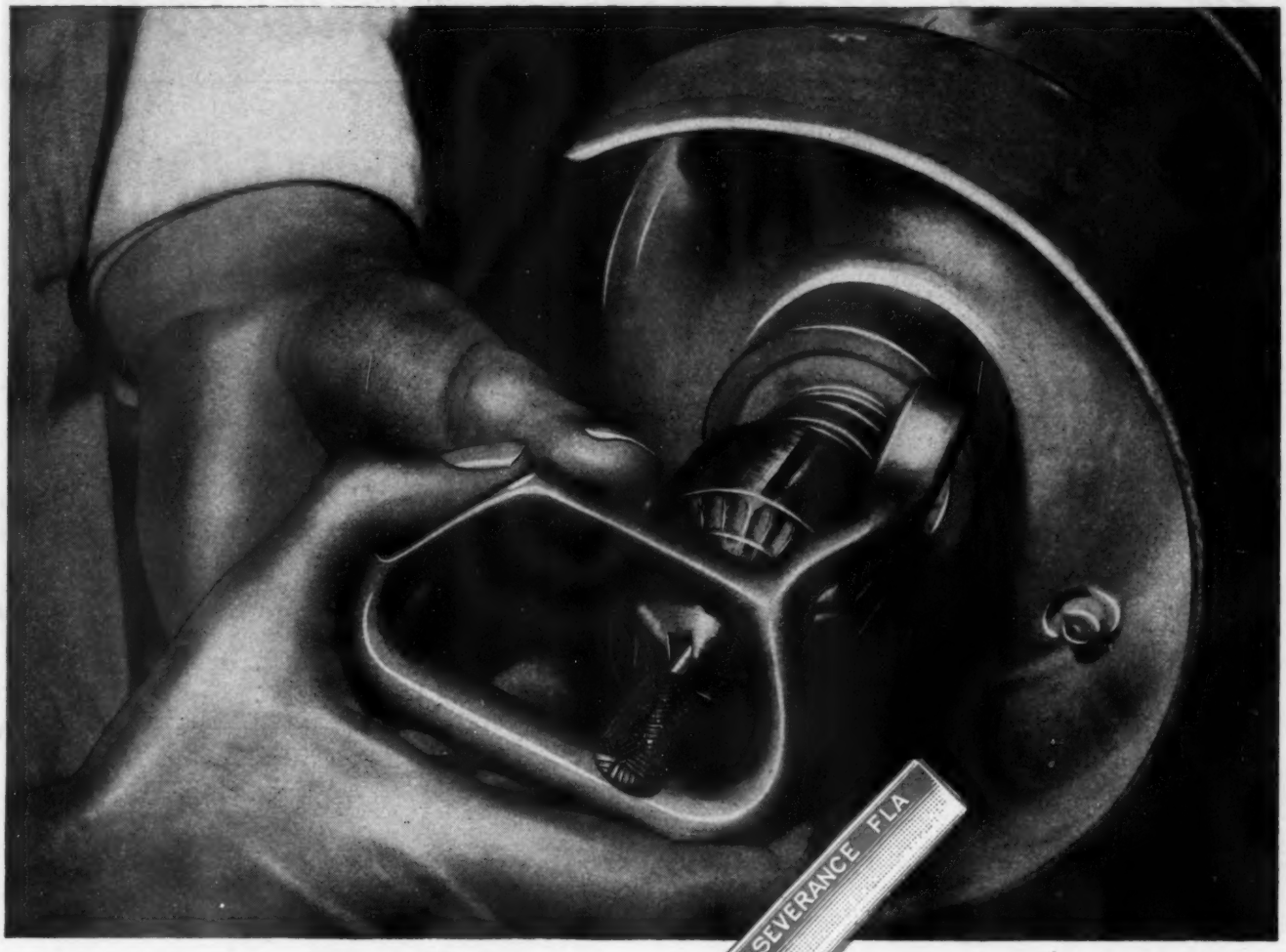
WORM WHEEL—Large diameter, 40:1 ratio, accurately generated, securely mounted on spindle.

EQUIPMENT—⅜" table slot tongues, three index plates are furnished, dividing all numbers to 50, and even numbers to 100, with the exception of 96T. The Index chart furnished gives all divisions obtainable to 380.

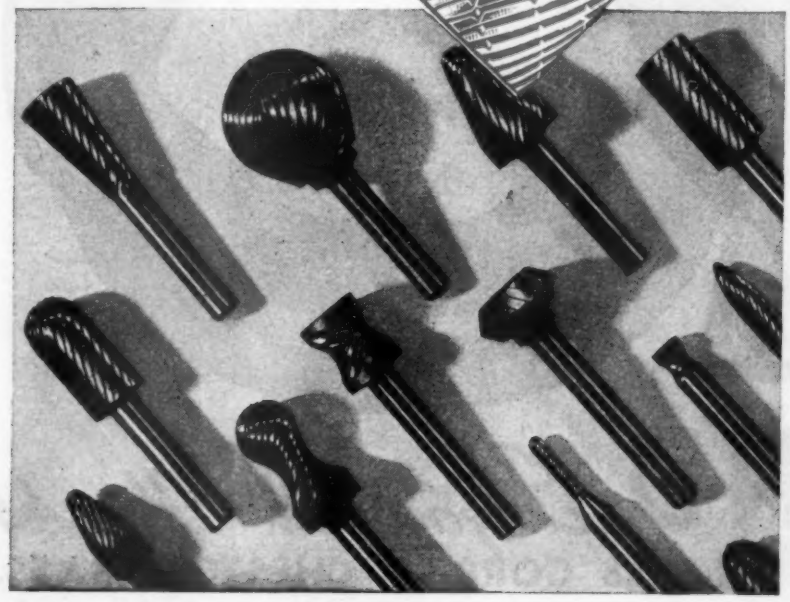
L-W CHUCK COMPANY

1-7 N. ST. CLAIR ST.
TOLEDO, OHIO

We also manufacture LATHE CHUCKS • MAGNETIC CHUCKS • DEMAGNETIZERS • MILLING MACHINE VISES • POWER HACKSAWS



SEVERANCE TOOLS ON STATIONARY SET-UP SPEED FINISHING OF SMALL PARTS



Above you see a Severance Midget Milling Cutter being used in a stationary set-up which many manufacturers of small parts have found to be a great time saver. The part is held in the hand, the tool is held in a chuck on almost any type of bench lathe, polishing unit or flexible shaft mounted in a vise.

No matter how they are used, Severance Midget Milling Cutters do the job of finishing faster and cleaner than any other type of rotary tool. They take deep, sharp bites and can be successfully reground scores of times.

In addition to high speed cutters, Severance "Carbide" Midget Milling Cutters are also now available in a wide range of shapes and sizes. Carbide cutters are recommended for metals or other materials having an extremely hard, abrasive, scale. Write for complete facts about how Severance Midget Milling Cutters can help you speed up your cleaning and finishing operations.

Severance

SEVERANCE TOOL INDUSTRIES, INC., SAGINAW, MICHIGAN. PLANTS IN LONG ISLAND CITY, NEW YORK; DETROIT, MICHIGAN; FORT WAYNE, INDIANA; CHICAGO, ILLINOIS; LOS ANGELES, CALIFORNIA.

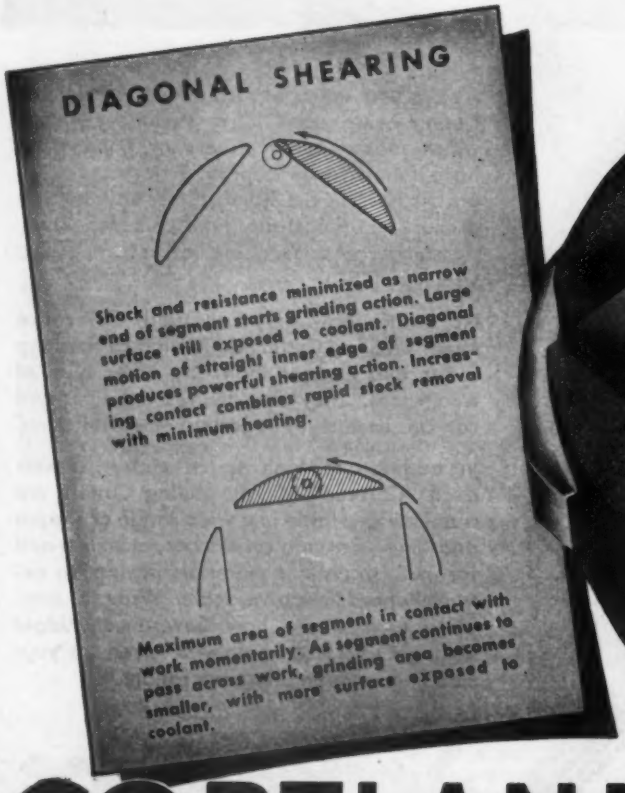
Machine Production Doubled!...

Note the grinding time in this Production Test Run—a generous 50% saving! Note also that Cortland Segments cut fast and cool, with less wear, and require no dressing.

Production Test Run on Abrasive Machine Tool Co. No. 34 Vertical Surface Grinder with reciprocating table. Wheel speed, 2570 R.P.M. *Work:* Rear sight base for 30 cal. gun: Arma steel casting; 4 pieces per table load.

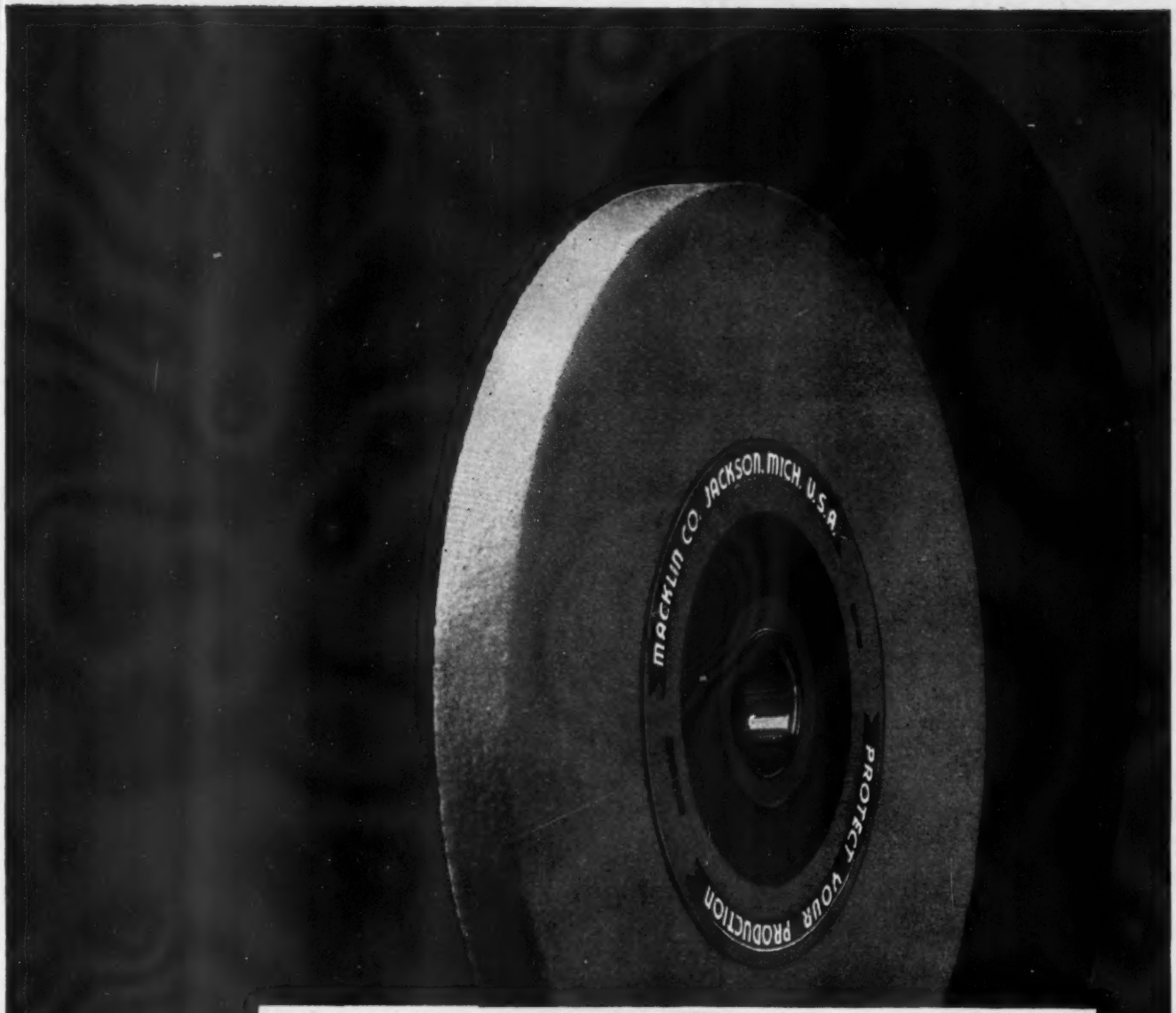
	6" Cup Wheel Competitive Make	**CORTLAND 8-IN. CHUCK AND SEGMENTS**
Total Feed	.015	.013
Stock Removed	.010	.010
Wheel Wear	.005	.003
Grinding Time	2 min. 40 sec.	1 min. 12 sec.

Send for the new bulletin that illustrates and describes Cortland Chuck and Segments.


DIAGONAL SHEARING
Shock and resistance minimized as narrow end of segment starts grinding action. Large surface still exposed to coolant. Diagonal motion of straight inner edge of segment produces powerful shearing action. Increasing contact combines rapid stock removal with minimum heating.
Maximum area of segment in contact with work momentarily. As segment continues to pass across work, grinding area becomes smaller, with more surface exposed to coolant.

CORTLAND *Segmental Chucks*

CORTLAND GRINDING WHEELS CORP. • CHESTER, MASS.



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MACKLIN Wheels are made in all sizes and shapes in all grain and grade combinations to ***"Protect Your Production."***

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THIS CUTTING-OFF BLADE *has no comparison*

- NO OTHER BLADE OFFERS THE CONVENIENCE IN OPERATION
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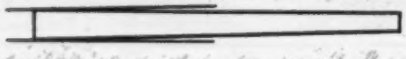
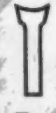
No other cutting-off blade possesses *all* these distinctive features—hollow-ground top, T-shape, and continuous taper its full length. The hollow-ground top



causes chip to collapse and relieve excessive friction against sidewalls. It also permits



coolant to reach actual cutting edge. The T-shape provides constant back clearance which never disappears through repeated sharpenings. Empire Tool Company's Luers Patented Cutting-off Blade is the only machine-ground blade that incorporates all these

unusual advantages in one cutting-off tool. Here is a blade that deserves your serious consideration.

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YOU'LL BE ASTONISHED at the speed and economy with which these Metalite Cloth "Gadgets" do slow, costly little metal finishing jobs. The accuracy of finish or radius produced by them on many vital parts also contributes to the eventual performance and safety of the whole.

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—Use this productive Brown & Sharpe Machine on the quality milling of small parts

In addition to making cutters go further, the No. 000 Plain Milling Machine has unusual production possibilities in the rapid milling of small parts on a wide variety of materials.

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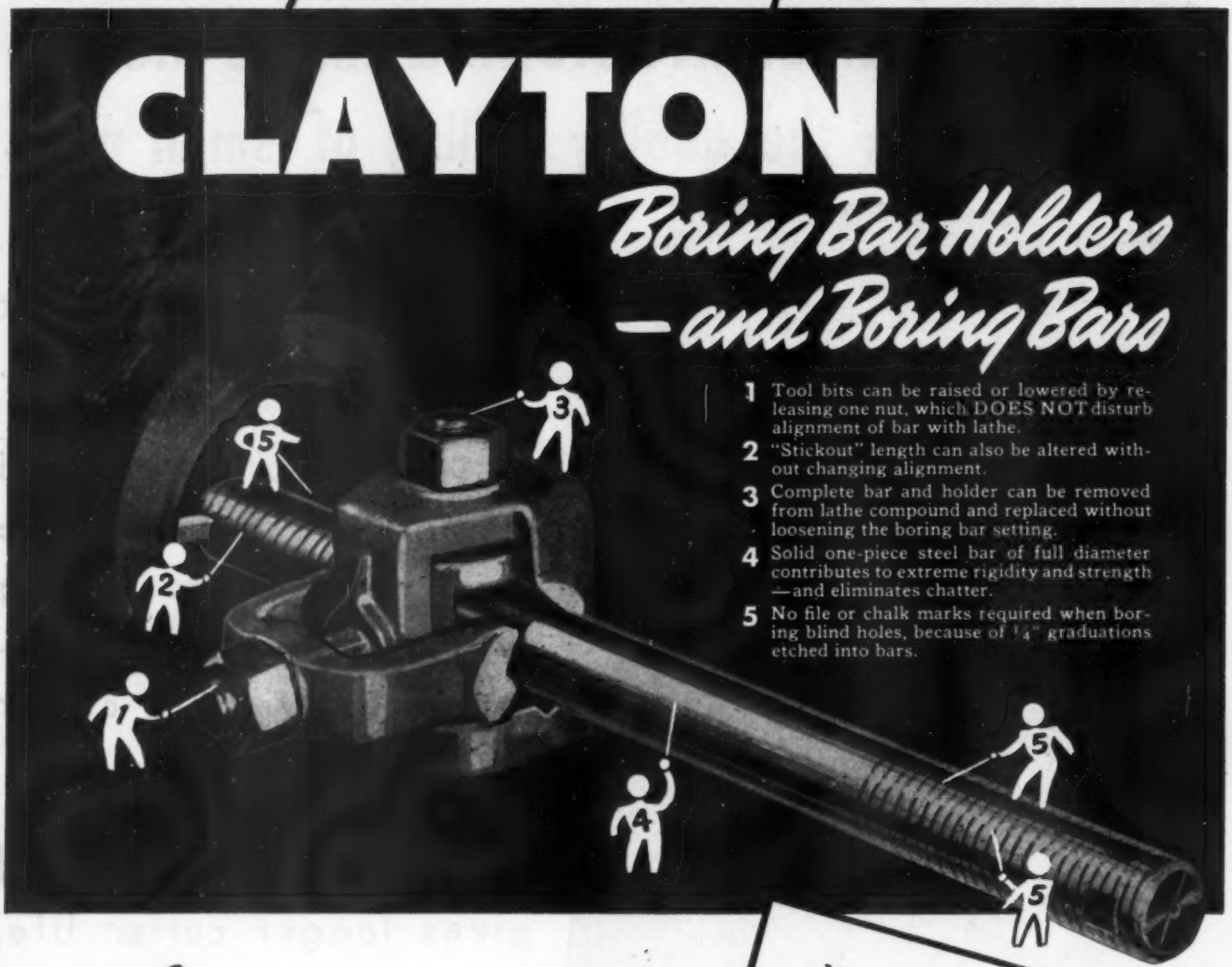
New Design Saves Time and Speeds Production

CLAYTON

Boring Bar Holders —and Boring Bars


1 Tool bits can be raised or lowered by releasing one nut, which DOES NOT disturb alignment of bar with lathe.
2 "Stickout" length can also be altered without changing alignment.
3 Complete bar and holder can be removed from lathe compound and replaced without loosening the boring bar setting.
4 Solid one-piece steel bar of full diameter contributes to extreme rigidity and strength —and eliminates chatter.
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Clayton Boring Bar Holders are quickly paid for in reduced set-up time. They are more rigid, permit deeper cuts, speed shop production. Available for lathes from 6" to 48".

PROMPT DELIVERIES ASSURED
Order from your local supplier or direct from factory

Any size Boring Bar (within capacity of Holder) fits through Bar Holder Body (A). Sliding dowel pin (B) maintains perfect alignment of clearance hole (C) in center post with V slots in Bar Holder body (A). Nut (D) rigidly clamps bar in holder. Nut (E) clamps body assembly to lathe compound. Either adjustment is made independently and without disturbing the alignment or adjustment of the other.
D
E
A
B
C

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CLAYTON MANUFACTURING COMPANY

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YOU CAN HAVE AN

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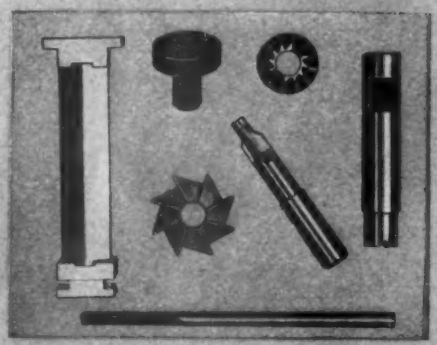

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UNIVERSAL MILLING FIXTURE

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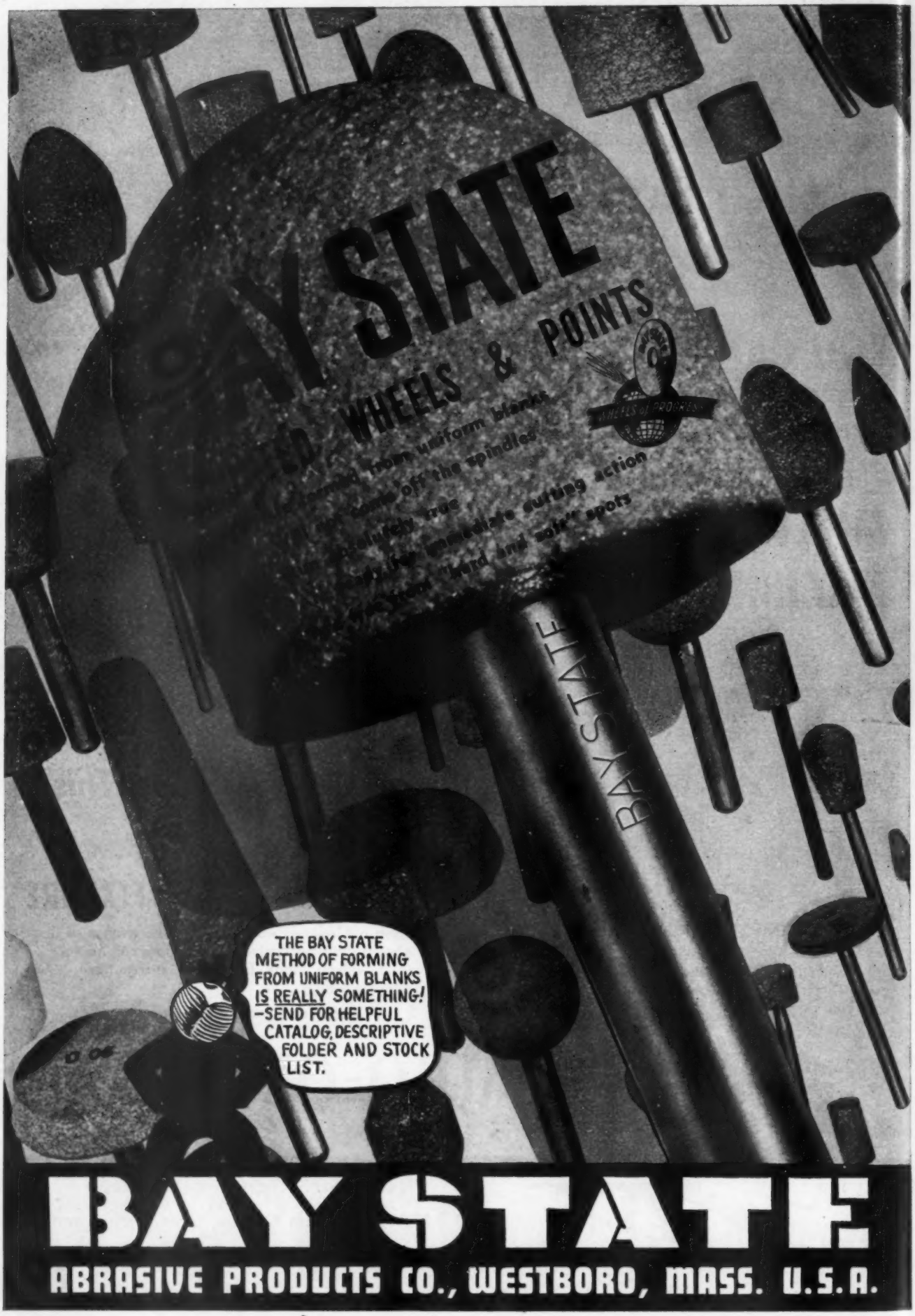
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2 It enables the operator to quickly locate and level the work before moving it towards the "Go" and "Not Go" anvils.

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VICTOR has just issued a new catalog covering the complete line of Hack Saw Blades, Frames, Power Saws, Band and Contour Saws.

*T. M. Reg. Blades bearing the name "Moly" are made only by Victor Saw Works, Inc. and affiliated companies.

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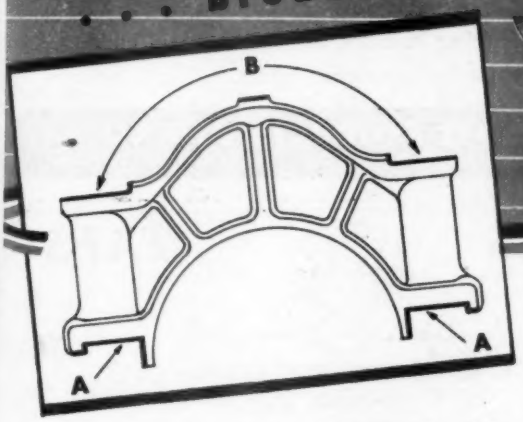
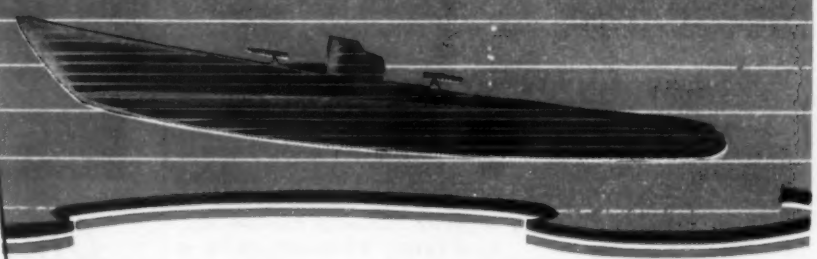
THIS UNUSUALLY LARGE BEARING CAP *Broached*

. . . broaches and fixtures by Detroit Broach





Here is where the accuracy and fine finish, so consistently secured by broaching, are desired more than production speed. This marine diesel engine bearing cap is broached from a rough forging that weighs forty-one pounds after broaching. Between three and four pounds of stock are removed. Yet the tolerance is held to .001″ on a 10⅛″ dimension and a good finish is obtained.

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The broaches and fixtures used for this work were designed and built by the Detroit Broach Company.

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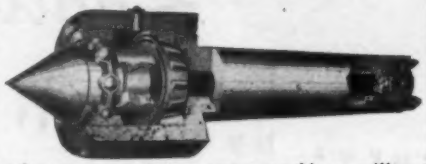

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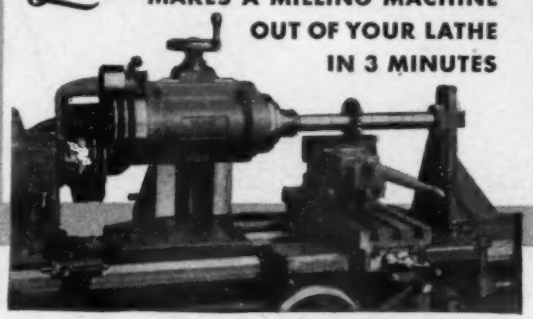

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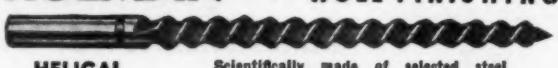

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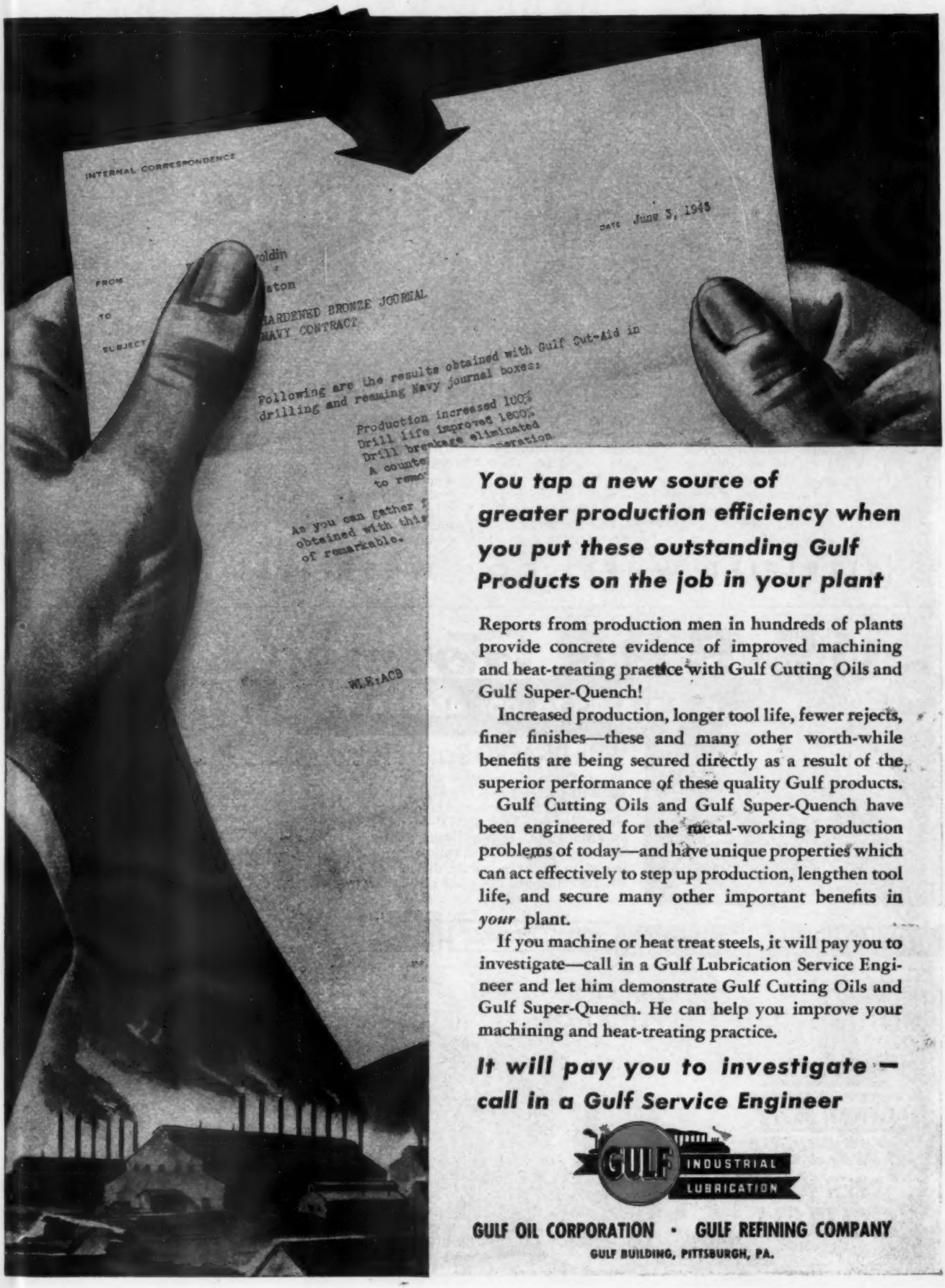

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Gulf Cutting Oils and Gulf Super-Quench have been engineered for the metal-working production problems of today—and have unique properties which can act effectively to step up production, lengthen tool life, and secure many other important benefits in *your* plant.

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IN 2 PLANES TO .001" ACCURACY

With DI-ACRO Bender No. 2

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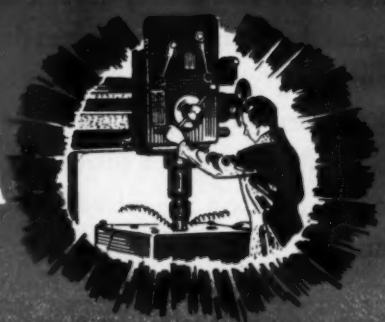
Ship worn-out High Speed Tools back to the steel mills . . . this high grade steel can do another war job.

EQUIP YOUR MACHINES *with high quality cutting tools*



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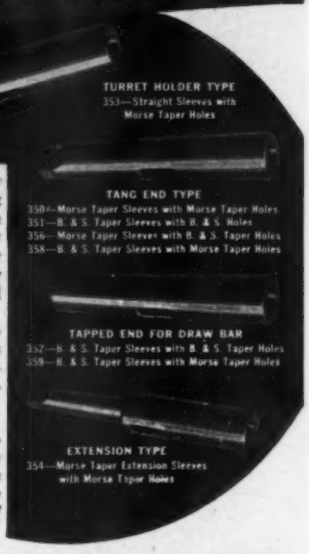
TURRET HOLDER TYPE
353—Straight Sleeves with Morse Taper Holes
TANG END TYPE
350—Morse Taper Sleeves with Morse Taper Holes
351—B. & S. Taper Sleeves with B. & S. Holes
356—Morse Taper Sleeves with B. & S. Taper Holes
358—B. & S. Taper Sleeves with Morse Taper Holes
TAPPED END FOR DRAW BAR
352—B. & S. Taper Sleeves with B. & S. Taper Holes
359—B. & S. Taper Sleeves with Morse Taper Holes
EXTENSION TYPE
354—Morse Taper Extension Sleeves with Morse Taper Holes

ON THE LEFT is illustrated an ordinary soft steel sleeve; on the right a Midwest Hardened and Ground Sleeve. Because Midwest Sleeves are scientifically hardened and precision ground, their length of accurate life is ten to twenty times longer than ordinary soft steel sleeves.

Furthermore, the longer life of Midwest Sleeves saves vital steels—steels otherwise consumed by repeatedly replacing soft steel sleeves which quickly become worn, marred and discarded.

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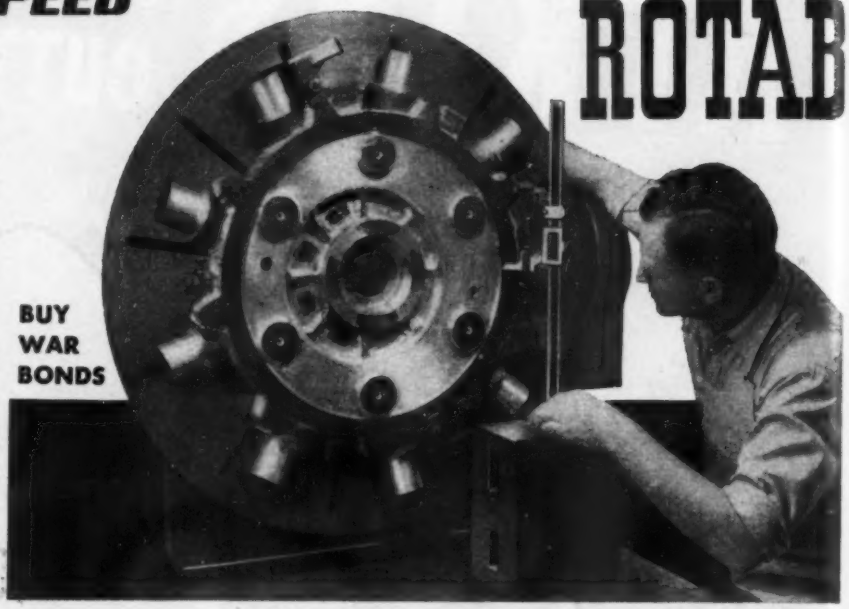

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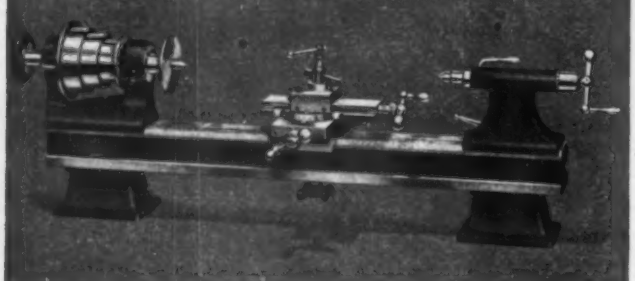

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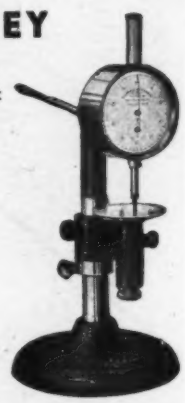

for rigid inspection of a wide range of parts . . .

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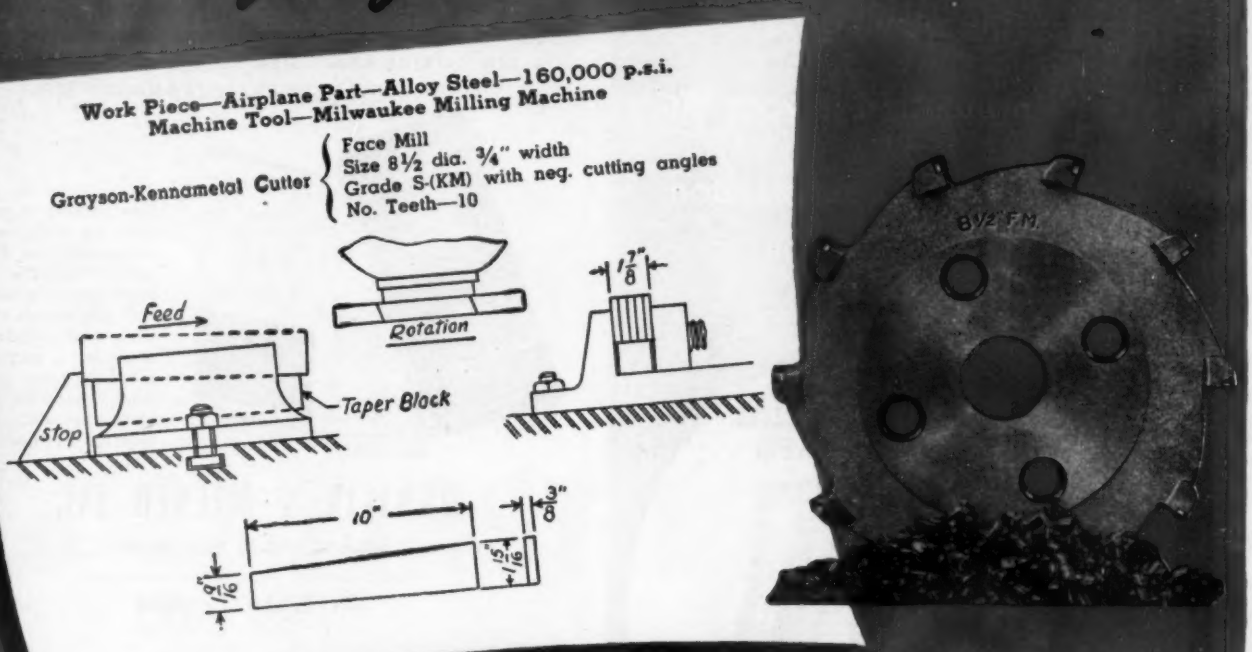

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COMPARATIVE PERFORMANCE

	High Speed Steel	GRAYSON-KENNAMETAL Mill
No. teeth in cutter	14	10
Speed	61 RPM	136 RPM
Feed	⅝"/min.	7¼"/min.
Floor to floor time per load	21 min.	3½ min.
Pieces per hour	14.4	86

This outstanding performance is typical of the revolutionary results being achieved with GRAYSON-KENNAMETAL cutters (Meehanite bodies, Kennametal inserts). Write for complete information, or better still, call the nearest KENNAMETAL representative and let him demonstrate the milling improvements that can be effected in *your* shop.

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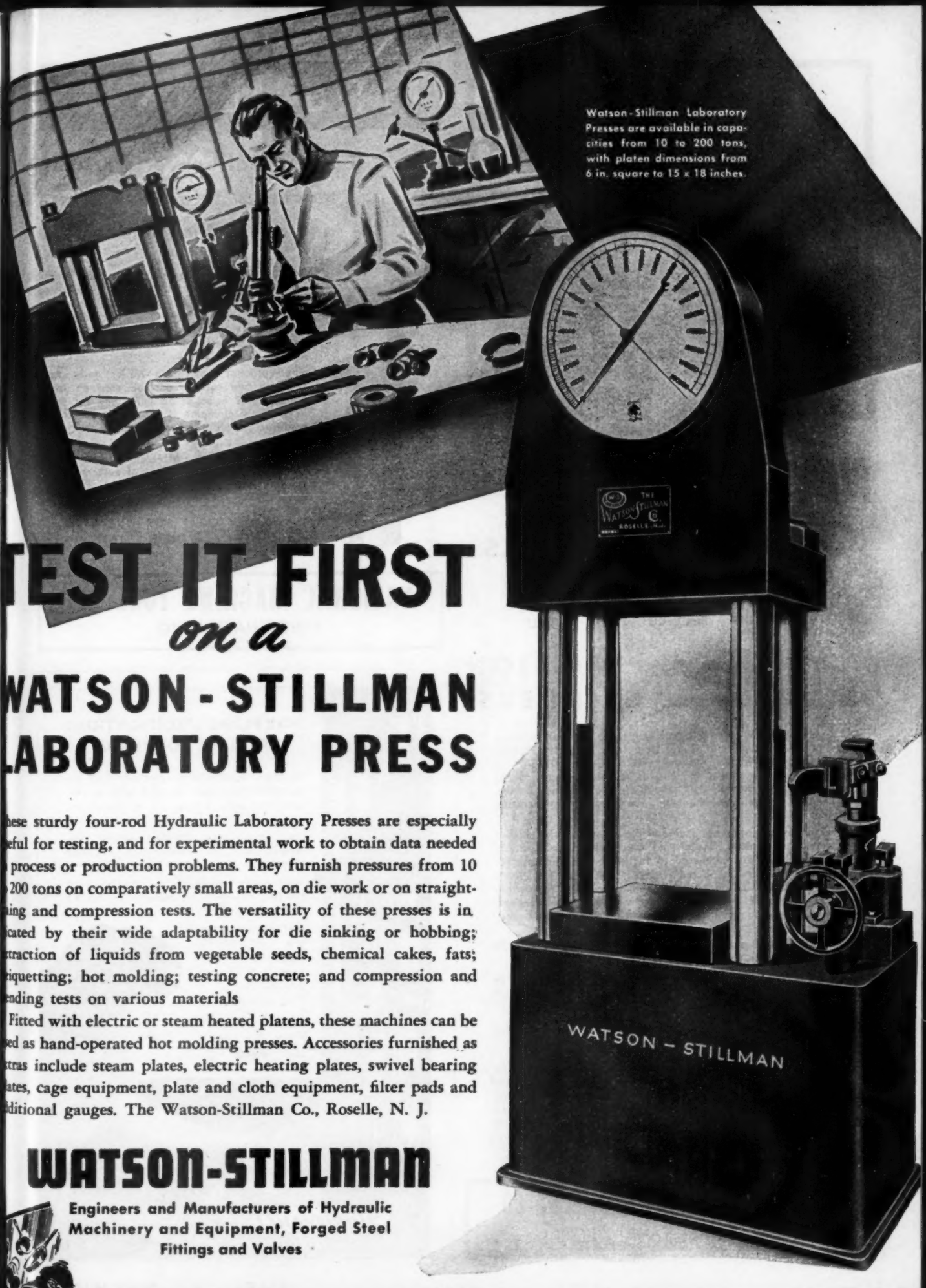

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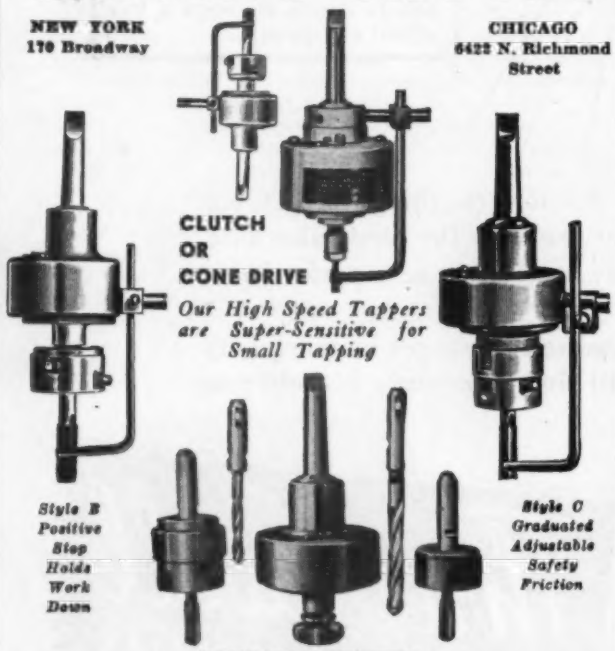

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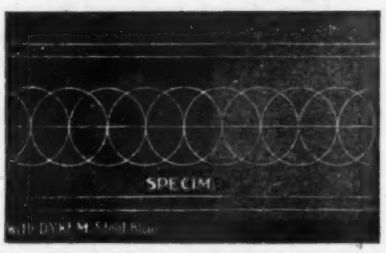

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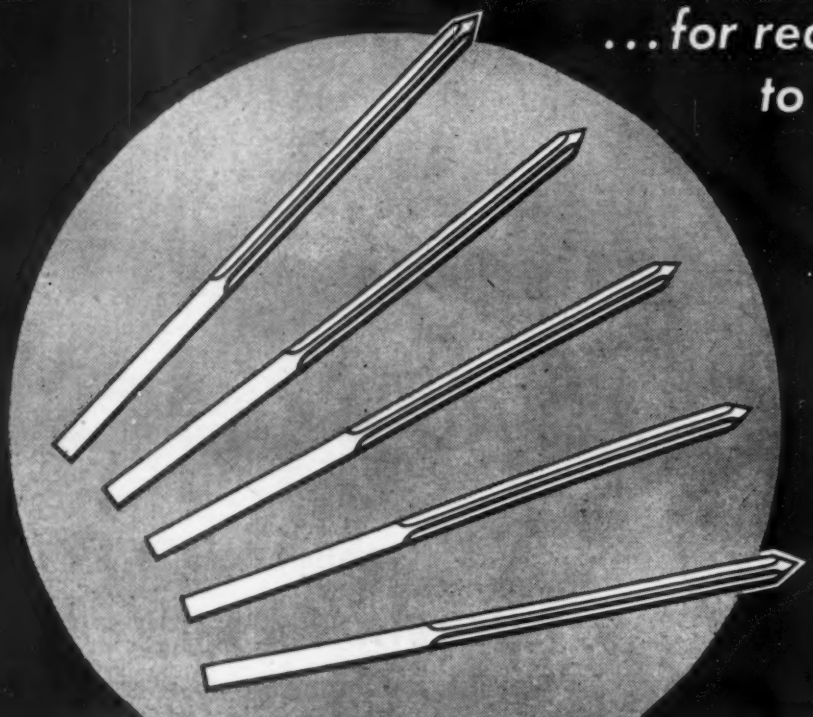

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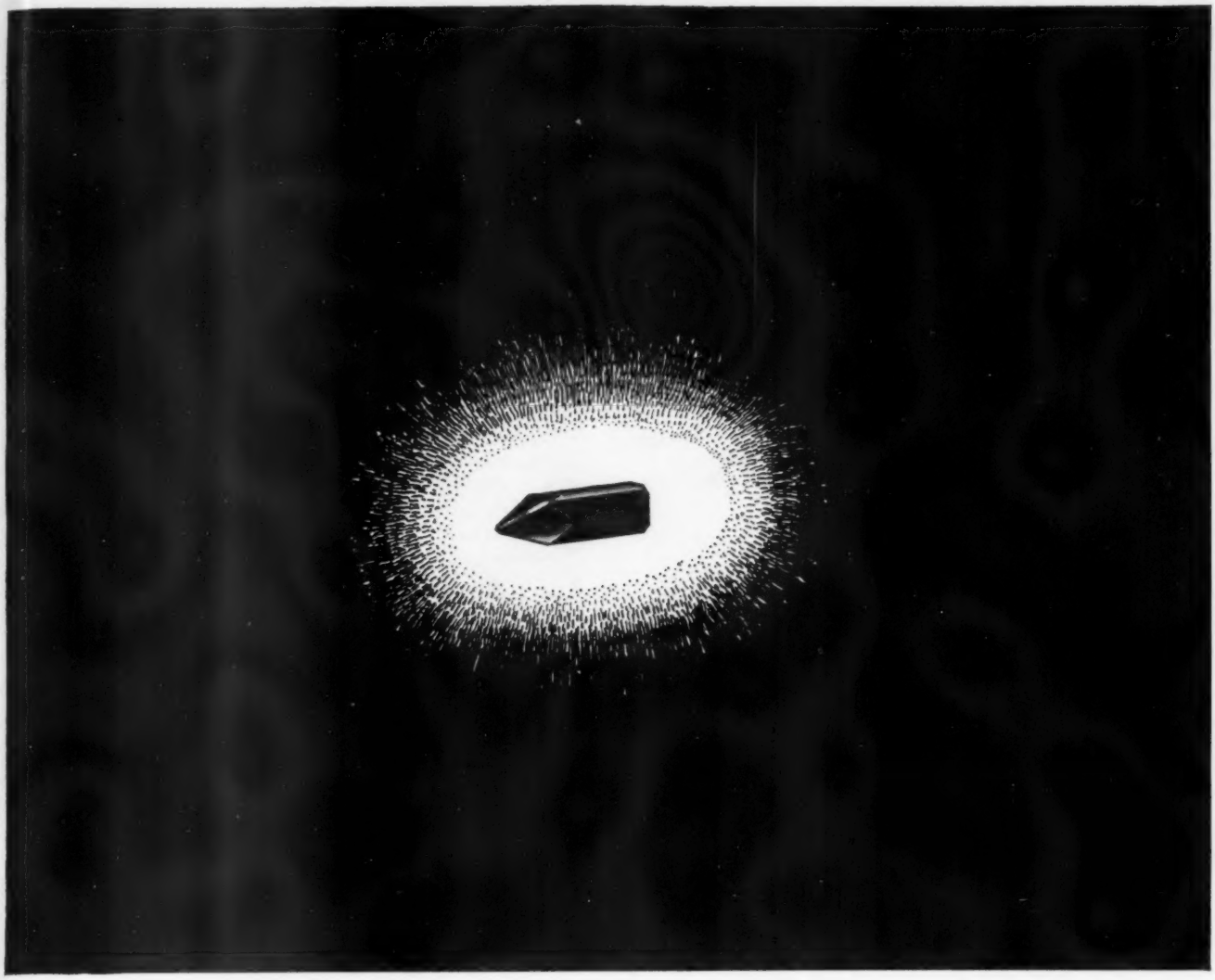

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Cut Thread

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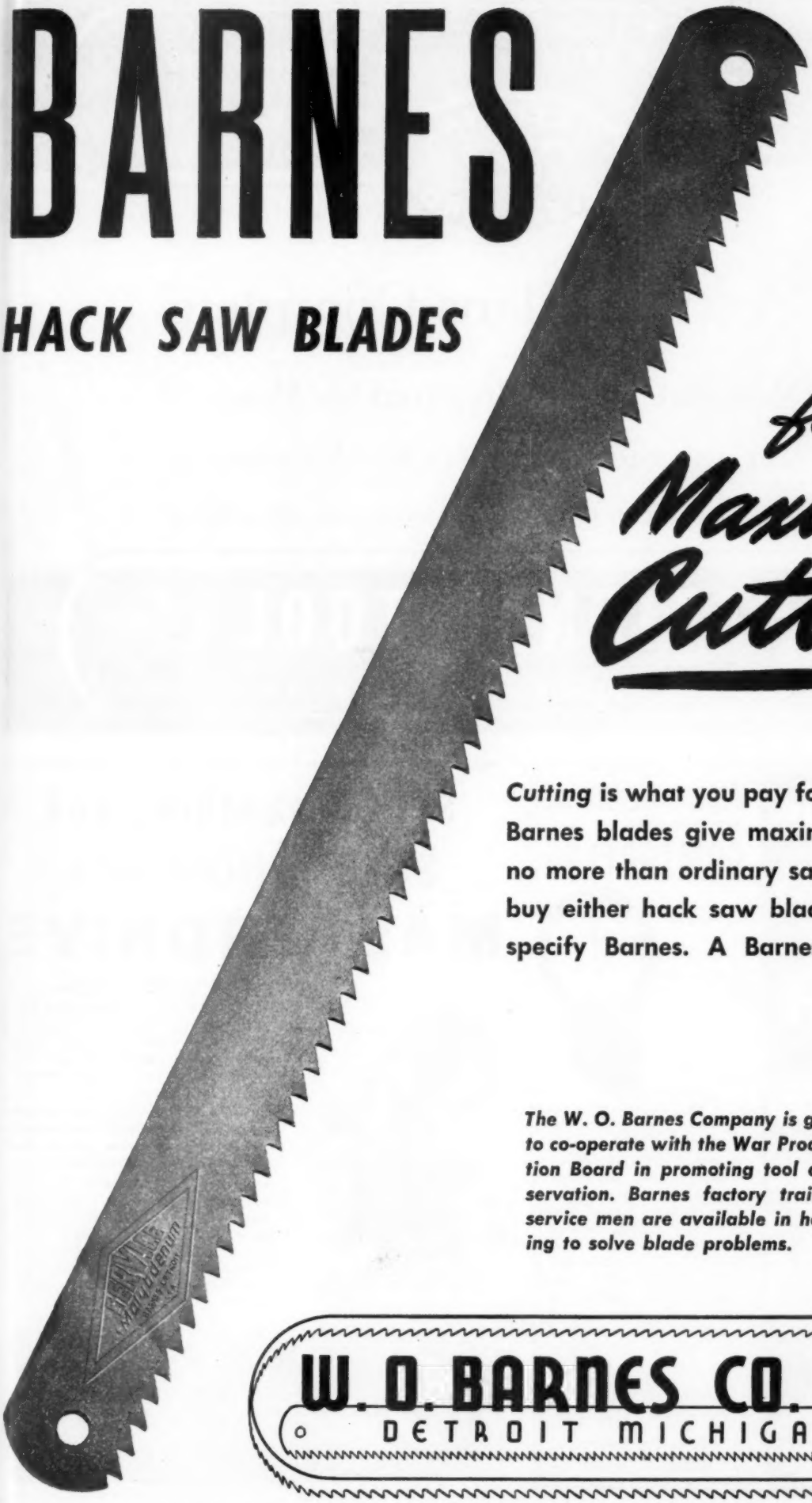

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★ SLITTING SAWS
★ SPECIAL TOOLS
★ REAMERS
★ BROACHES
★ COUNTERBORES
★ CIRCULAR AND FLAT FORM TOOLS
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Sizes: ¼" to 4" dia. and larger

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WAR PLANT REPORTER

THE JOB:
Grinding sets of Huther high-speed steel cutters for finning airplane cylinder barrels on a universal tool and cutter grinder.

THE WHEEL: Por-os-way 7"x½"x1¼" 9A60HV2.

All facts and figures given are taken from an actual field survey made by a Por-os-way correspondent.

THE RECORD	POR-OS-WAY WHEEL	FORMER WHEEL
Production per man per hour	5 sets (20 pcs.)	3 sets (12 pcs.)
Pieces per dressing	8 to 12	3
Wheel life	8 hours	6 hours
Stock to be removed	.010"—.018"	Same
Depth of cut per pass	.003"	.001"
Rejects	None	0.5 to 1%
Operations eliminated	Cutting shoulder	
Production Increase	66⅔%	
Remarks: Former wheel burned work. Por-os-way grinds cool, holds corner.		

Write for complete booklet "Facts About Por-os-way". The address is 430 Wheatland Street, Phoenixville, Pennsylvania.

2 TO 5 TIMES MORE WAR PRODUCTION PER MAN PER MACHINE

POR-OS-WAY* *a new* RADIAC* PRODUCT

A. P. DE SANNO & SON, INC.
NEW YORK, CHICAGO, PITTSBURGH, CLEVELAND, DETROIT, LOS ANGELES

PHOENIXVILLE, PENNA.
Western Gateway to
VALLEY FORGE

*T. M. Reg. U. S. Pat. Off.
COPYRIGHT, 1943, A. P. de Sanno & Son, Inc.

Soldering 'Em to STAY Soldered

Photo Courtesy Douglas Aircraft Company

with KESTER

- The vital function of solder is to *stay put*, come what may—and that's exactly what Kester Cored Solders are scientifically compounded to do. They're in action, night and day, on every battlefront from the Arctic to the Tropics.
- Kester Cored Solders are *right* for every soldering job. They're available in a wide range of core and strand sizes, fluxes and alloys, one combination of which is exactly suited to every requirement, however special.
- Electrical circuits installed with Kester Rosin-Core Solder are free from terminal resistance; service difficulties of every sort are minimized. Kester Acid-Core Solder for general application makes a tight, clean, permanent union.
- Kester's 44 years of highly specialized solder experience is at your command. Consult Kester engineers freely on any soldering question.

SILVER-LEAD ALLOY—Kester is prepared to offer for test on your work, a wartime solder of silver and lead, in cored and wired form.

KESTER SOLDER COMPANY
4223 Wrightwood Avenue, Chicago, Illinois

Eastern Plant: Newark, N. J.
Canadian Plant: Brantford, Ont.

KESTER
Cored Solders
STANDARD FOR INDUSTRY

BIG OR SMALL

- Noblewest High-Speed Precision Marking Machines are designed to mark your products, regardless of shape or size, faster, better, at lower cost. With the famed Noblewest rolling process, production speeds for marking, knurling or graduating, are practically unlimited. Write for wartime catalog supplement No. 43.

MODEL 186 Shown at left is tooled for marking 5 inch High Explosive shells.

NOBLE & WESTBROOK MANUFACTURING CO.
Marking specialists since 1904
EAST HARTFORD CONN.

MARK IT BEST WITH NOBLEWEST — NOBLEWEST IMPROVED MARKING DEVICES

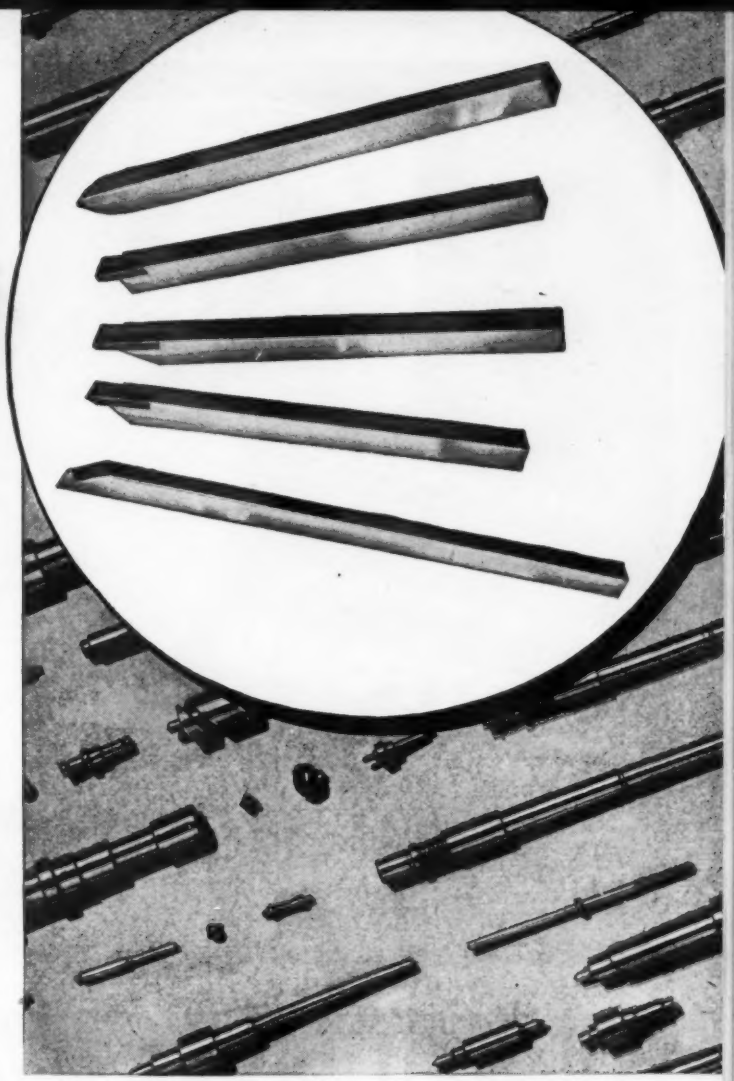
CRITERION
Boring Heads
Speed PRODUCTION

These Criterion heads save time! Smooth, compact, rigid! Large, easy-to-read, graduated dial. Lead screw is hardened tool steel. ITS THREADS ARE GROUND FROM THE SOLID AFTER HARDENING, assuring constant accuracy. Parts subject to wear are hardened. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3" ½" and 1" bar capacity Ask your dealer, or order direct. Request free literature

CRITERION MACHINE WORKS
BEVERLY HILLS CALIFORNIA
NEW YORK OFFICE 205 E. 42ND ST., N. Y.

SIMPLE

STANDARD, LOW-COST TOOL BITS DO ALL JOBS *like these...*



GORTON 16-A produces the most complex precision parts with only the simplest single-point tool bits—either high-speed steel or carbide-tipped.

SIMPLE

SET-UPS . . . ADJUSTMENTS . . . OPERATION . . . All vital parts and controls instantly accessible—insures simple, quick, low-cost set-ups. Centralized fingertip controls provide infinitely variable spindle speeds and cam feeds—*no speed or feed gears to change.* Extreme accuracy and exceptional finish assured; subsequent finishing operations usually eliminated.

PRECISION PARTS COMPLETE IN *1* OPERATION

The Gorton 16-A produces an almost endless variety of short or long slender parts—simple or complex—complete in *one* operation. It does step and contour turning and chamfering in multiple diameters—centers, drills, threads, slots—tapers . . . knurls . . . back recesses . . . pivot points . . . etc.

WIDE RANGE OF WORK

TURNS ANY DIAMETER from .005" to 7/16" Bar Capacity of Machine

GEORGE GORTON MACHINE CO.
1315 Racine St., Racine, Wis.

Send me, without obligation, FREE bulletin with complete information covering the Gorton 16-A Precision Automatic Screw Machine.

Name.....*Title*.....
Company.....
Address.....
City.....*State*.....

GET THE FACTS NOW

Mail Today for FREE Bulletin

GOLDEN ANNIVERSARY 1893-1943

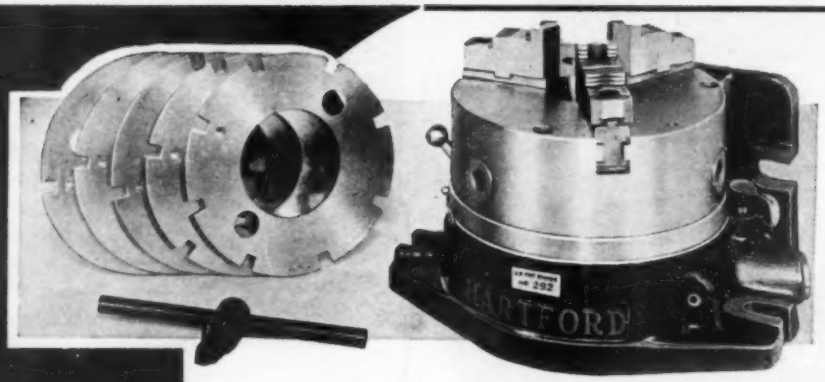
GORTON

20 YEARS OF PRECISION TOOLS

GEORGE GORTON MACHINE CO.

1315 RACINE STREET, RACINE, WISCONSIN, U. S. A.

SPECIALISTS FOR 50 YEARS IN REPRODUCING FROM MASTERS—ENGRAVING, DIE MAKING, VERTICAL MILLING MACHINES



Speed production by saving set-up time on indexing operations with the

HARTFORD SUPER-SPACER

High returns — in speed, accuracy and better work at lower cost — are assured by this modern, sturdy indexing device. Applied to your millers, drills, slotters, planers or jig borers, the HARTFORD SUPER SPACER makes it possible to step up speeds and feeds on indexing work. Accuracy is assured by the use of mask plates which eliminate all chance of error.

The HARTFORD SUPER-SPACER pays big dividends whether used on long run production or on single piece tool room work.

●

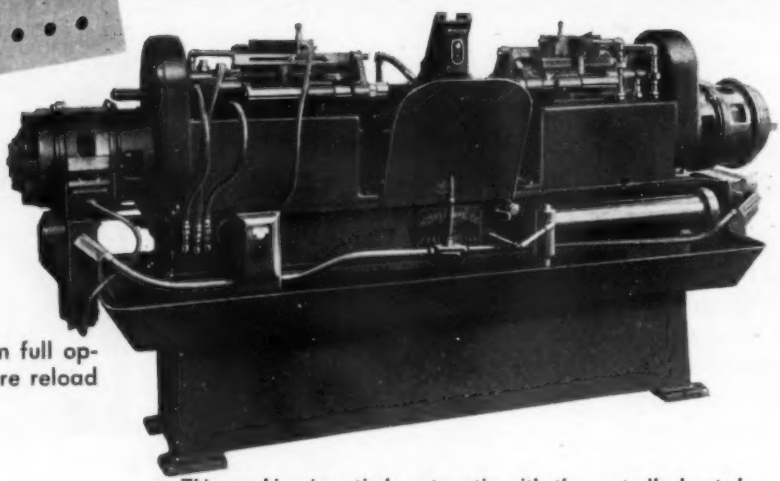
Send at once for complete information and data on typical applications.

THE HARTFORD SPECIAL MACHINERY COMPANY

HARTFORD CONNECTICUT

PISTON PINS *Taper* REAMED

6 per minute...



★ Fully automatic Double End Machine containing two 3-h. p. HOEFER Hydraulic Units and a special hydraulic fixture. Taper reams six piston pins per minute, both ends.

The operator fills hopper and machine handles pieces automatically. The hopper is in full operation for 10 minutes machining 60 pins before reload is necessary.

Pins are 1-1/16" O. D. x 3⅝" long.

Safety devices prevent collision of reamers.

HOEFER Units, suitably mounted and equipped with HOEFER Multiple Spindle Heads, meet every production drilling requirement at a fraction of the cost of special drilling equipment.

Let us give you more details on this equipment — its immediate application to today's needs and its advantages for post war production.

• This machine is entirely automatic with the centrally located hydraulic holding fixture, operated by a separate motor, interlocked with the HOEFFER Units, with the following work cycle:

1 — Jaws open, permitting pin to enter from chute.
2 — The jaws close automatically, starting work feed.
3 — The two horizontal spindles approach the work at rapid traverse, changing to work feed as reaming begins.
4 — Spindles withdraw at rapid traverse.
5 — Jaws open, permitting finished piece to drop out.

The operator's only duty is to keep the work chute filled.

Hoefer's Whole Business is Holes . . .

HOEFER MFG. CO. *Freeport, Ill.*

CARLTON RADIALS
IN THE MACHINE TOOL INDUSTRY

★ Here is a battery of five CARLTON RADIALS in one of the largest machine tool plants in this country. Many more Carlton Radials are also giving satisfactory service throughout this plant.

This is only one of a great majority of Machine Tool Manufacturers using Carlton Radials.

THE CARLTON MACHINE TOOL COMPANY

Manufacturers of RADIAL DRILLS *Exclusively*

CINCINNATI 25, OHIO, U. S. A.

BUILT FOR FAST TAPPING from Head to Foot--

Ettco-Emrick
FOOT-OPERATED
TAPPING
MACHINE

FROM the 2-spindle Head, with its hair-trigger sensitive friction clutch and automatic reverse, right down to the delicately counter-balanced foot pedal, the Ettco-Emrick Tapping Machine is designed and built to make high speed, accurate tapping sure and easy.

All the operator has to do is feed the work and step on the foot pedal. The skill ordinarily needed in tapping and the speed are built into the machine.

That's why unskilled operators—men or girls—can easily maintain productions up to 2400 holes per hour with the standard head and all the way up to 12,000 holes per hour with available Ettco-Emrick Multiple Spindle Heads.

The 2-Spindle Head is Standard Equipment

GET THESE BULLETINS FOR FULL DETAILS

BULLETIN No. 4
Covers the Tapping Machine

BULLETIN No. 3
Covers the Multiple Heads

COPIES MAILED ON REQUEST

Write for yours today.

IMPORTANT

Recommendations on the best way to handle specific tapping jobs are always available to users of Ettco-Emrick equipment.

ETTCO TOOL CO.

590 Johnson Ave., Brooklyn 6, N. Y.

DETROIT • CHICAGO

The famous Ettco-Emrick DRILL CHUCKS • TAP HOLDING CHUCKS
TAPPING ATTACHMENTS • TAPPING MACHINES
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS
Unexcelled for Design, Materials and Workmanship

UNIFORMLY GROUND TOOL BITS KEEP SCREW MACHINES IN FULL PRODUCTION

- More Pieces Per Grind
- Increased Machine Capacity
- Savings in Set-Up Time
- Tool Steel Conserved

With Boyar-Schultz Model F Grinding Fixture mounted on a surface grinder, the recommended clearances difficult to grind by hand are easily and quickly produced. Substantial savings are to be accomplished with this fixture.

Stocks of bits can be ground for central stores with assurance that all bits will be ground exactly the same.

Write For Complete Description

BOYAR-SCHULTZ CORPORATION

2109M Walnut Street **Chicago, Illinois**

HARDNESS TESTER

Let the SCLEROSCOPE speed up the production of that s so we can blow the Axis to HELL

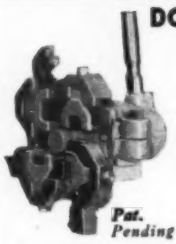
Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.

9025 VAN WYCK AVENUE
JAMAICA, NEW YORK

TELEPHONE: JAMAICA 6-4090

DON'T WAIT FOR TURRET LATHES



Pat. Pending

4-Tool Tool-Post Turret

"Jefferson Turrets are real production tools — substantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market."

CONVERT your engine lathe into a turret lathe in 15 seconds. To fit Bench lathes and lathes up to 24" swing. Designed to increase production. 6 DAYS DELIVERY.

The 4-Tool Tool-Post Turret is made in 2 sizes. The 5-Tool Tail-Stock Turret is made in 4 sizes. Also Adjustable Pull Feed—easily attached. All tools are precision attachments. Write for further details.

5-Tool Tail-Stock Turret

Pat. Pending

Also — Jefferson Precision Milling Machines, Milling Machine Dividing Heads, Vises, Belt Sanders, Swing Frame Grinders, Gyratory Foundry Riddles

JEFFERSON MACHINE TOOL CO.

80. SWEENEY, CUTTER & FOURTH STS., CINCINNATI, OHIO

CONSIDER

THE MACHINING OF A PART LIKE THIS!

SUPPOSE you had a contract to turn out thousands of the highly eccentric spool-like cams pictured here. Consider the work—the man-hours, the expense — of producing them unit by unit. What would your per unit cost soar to? How many rejects would you have to expect? What about the time element? What would happen to your production schedule?

The manufacturer of this cam eliminated those questions by *Turning to Turchan,* the all-hydraulic duplicator. A Turchan Follower, attached to a standard type lathe, proved to be the perfect answer to his problem. They are now produced about 20 times faster than was possible previously. You, too, can *Turn to Turchan* and save time, money and reject worries.

Turchan Followers attach easily to any standard type lathe, planer, shaper, grinder or mill. They do not interfere with normal use of the machine and what is just as important, they fit equipment you now have in your plant. You do not have to purchase new and expensive machine tools to use a Turchan Follower.

Turchan Followers, made for one, two or three dimensional work, are tops when it comes to die sinking or any other eccentric contour job. Write today for our new illustrated booklet.

TURN TO *Turchan*

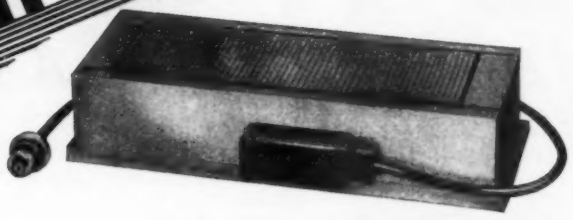
FOLLOWER MACHINE CO.

Originators of Hydraulic Duplicating Attachments

8251 Livernois Avenue — Detroit 4, Michigan

WALKER MAGNETIC CHUCKS

Style B Face Plate—in standard diameters from 10⅜" to 36⅜" inclusive.



No. 617 Bar Pole Face Rectangular Magnetic Chuck.

DEMAGNETIZERS

Walker DEMAGNETIZERS are available in standard D.C. and A.C. types for either 110 or 220 v. Ask for Bulletin K7 giving detailed specifications.

A FULL LINE OF PROVED STANDARD DESIGNS

Walker offers prompt and complete service on magnetic chucks by carrying in stock a considerable line of Rectangular and Rotary types for use on all surface and internal grinding machines built by American machine tool manufacturers. These units—for grinding, milling, planing and turning operations—are of proved design and are available in such a complete range of sizes as to enable you to select standard units for practically any chucking problem. Write for bulletin W4 giving detailed information.

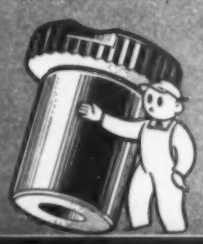
Also special CHUCKS *for special* NEEDS

The design of Walker Magnetic Chucks is such that "specials" can be developed and furnished at prices only slightly more than standard units. If you require special magnetic chucks for special purposes, consult Walker and be assured of prompt, economical service.

O. S. WALKER CO., INC.
WORCESTER, MASS.

Universal Drill Bushings Back the Attack!

Universal Drill Bushings are playing an ever-increasing role in America's War Production. Because of their straight and round superfinished bores, Universal bushings save tools, wear longer and assure greater accuracy in all types of drill jig work. Write for complete catalog.



UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

SHIELDS NO. 3 VERTICAL UNIVERSAL MILLER

Delivery 4 Weeks

CONDENSED SPECIFICATIONS

Table Working Surface—64" x 16". Longitudinal Power Travel—34". Cross Power Travel—14". Vertical Power Travel—17½".

Write for complete detailed specifications

SHIELDS MANUFACTURING CO., Inc.
LONG ISLAND CITY, N. Y.

LUERS

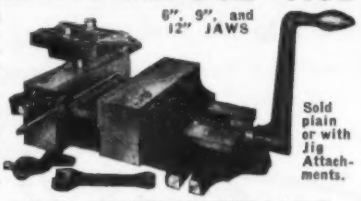
Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

GRAHAM MULTI-PURPOSE VISE

In addition to being an extra well designed plain vise (of parallel, flush, four-square construction), this tool also serves an amazing variety of uses as a jig and fixture when used with the numerous Jig Attachments. For miller, drill press, radial, planer, shaper, grinder, etc.



KNURL HOLDER FITTING LATHE TURRET

Adjustable to produce straight, spiral and checkered knurling with the same pair of straight knurls. Capacity up to 2½" dia. of work. Shank made to fit your turret.

Request Illustrated Price Circulars

GRAHAM MFG. CO., 89 BRIDGE ST. EAST GREENWICH, R. I.

How else could you do this job economically?

To weld all seams and joints of this complex weldment down hand, the weldment had to be tilted, rotated, twisted, and turned — had to be held in a score of different positions. This is easily done with a C-F Positioner, for at the push of a button it will rotate a weldment (thru 360°) or tilt it (thru 135° beyond horizontal).

Without a Positioner it would require almost constant attendance of a crane and its sling crew, with horses and plenty of floor clearance for handling.

C-F Welding Positioners come in sizes and capacities up to 30,000 lbs. All are pedestal mounted and are adjustable for height.

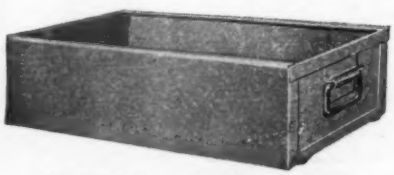
Write for Bulletin WP-22.

CULLEN-FRIESTEDT CO.
1313 S. Kilbourn Ave.
CHICAGO 23, U. S. A.

IMMEDIATE SHIPMENT

STEEL BOXES

FOR YOUR PRODUCTION NEEDS



STYLE 300 — STACKING BOX

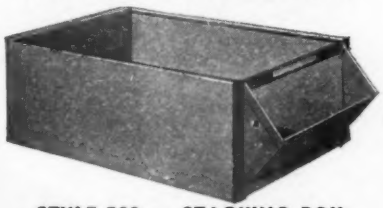
Just right for your small parts. Light in weight, easy to handle. Equipped with drop handles each end. Runners save wear on bottom of box and act as positive stacking lock.

No. 301	6″ x 9″ x 3½″	20 ga.	$ .55 Ea.
No. 302	8″ x 12″ x 4″	20 ga.	$ .60 Ea.
No. 303	9″ x 13½″ x 4½″	19 ga.	$ .75 Ea.

STYLE 600 — STACKING BOX

An ideal all-purpose shop box, Sturdy all-weld construction. Heavy skids act as positive stacking lock and re-inforce box at point of maximum wear.

No. 601	10″ x 16″ x 6″	18 ga.	$ .95 Ea.
No. 602	12″ x 18″ x 8″	16 ga.	$1.25 Ea.



STYLE 500 — STACKING BOX

Open front makes contents easily accessible when boxes are stacked. Will stack with Style 600 boxes.

No. 501	10″ x 16″ x 6″	18 ga.	$1.15 Ea.
No. 502	12″ x 18″ x 8″	16 ga.	$1.50 Ea.

Prices F.O.B. Factory, Phila. — Any Quantity Order Today. Write, Wire or Phone.

AMERICAN METAL WORKS, INC., **1509 Germantown Ave., PHILADELPHIA, PA.**

"Super Satisfaction"

Of course he's satisfied! Like most production men who use Super Carboloy-Tipped Milling Cutters, he is getting faster, more accurate and more economical milling production. He is typical of users throughout the country who report such amazing production records as these . . . "With Super Milling Cutters we decreased the cutting time on one job 200%." "On a bronze alloy job we increased the number of pieces per grind 700%." "On a steel milling job we now complete a standard run in 2 hours that formerly took 8 hours."

Other users of Super Carboloy-Tipped Milling Cutters will tell you that in cast iron and non-ferrous materials they can run at machine capacity with feeds of .002" to .005" per tooth. In steel with tooth loads of .0005" to .0025" they can run at surface speeds of 400 to 800 feet per minute. That's performance you shouldn't overlook in times like these!

Why not learn more of the advantages of these milling cutters that are establishing new records in speed, accuracy and economy on all types of milling operations? Let us send you a descriptive folder.

★

OTHER SUPER CARBIDE TIPPED TOOLS FOR

Turning, Facing, Reaming, Spotfacing, Forming, Grinder Rests, Wear Parts, Boring, Drilling, Grooving, Counterboring, Shaving, Centers and Special Purposes.

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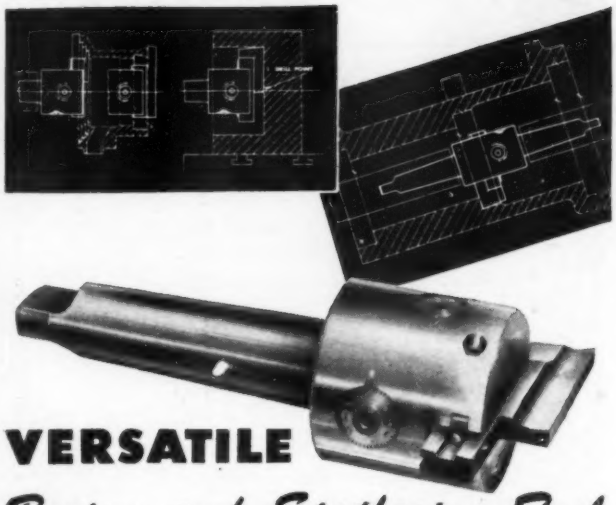
(All sizes available for early shipment)

SUPER TOOL CO.

21650 Hoover Road, Detroit 13, Mich. ★ 4105 San Fernando Rd., Glendale 4, California

Carbide Tipped Tools



VERSATILE

Boring and Spotfacing Tool

IN ADDITION to simplifying precision boring through the use of micrometer settings and making possible the facing of surfaces flat and square with holes, this unique B & B Tool brings you many other advantages.

It can be used for inverted boring and back spotfacing; it will bore and face many diameters at one time with a stepped blade; it presents a definite advantage in boring blind holes; and is a decided asset for use in boring long holes.

It will enable you to produce more accurate work with fewer motions in much less time. Users consider it one of the most valuable tools in their tool rooms.

The many sizes of standard blades available provide an exceptionally wide range of cutting widths.

BUY WAR BONDS

BOKUM TOOL CO.

14775 WILDEMERE AVE. DETROIT 21, MICH.

"ROCKWELL" HARDNESS TESTER

QUICK DELIVERIES are again possible.

NEW MODELS are enormously improved.

Made Only By

WILSON

MECHANICAL INSTRUMENT CO. INC

Concord Ave., New York 54

HIGH SPEED CENTERS.

WILL OUTWEAR 10 CARBON STEEL CENTERS

because . . .

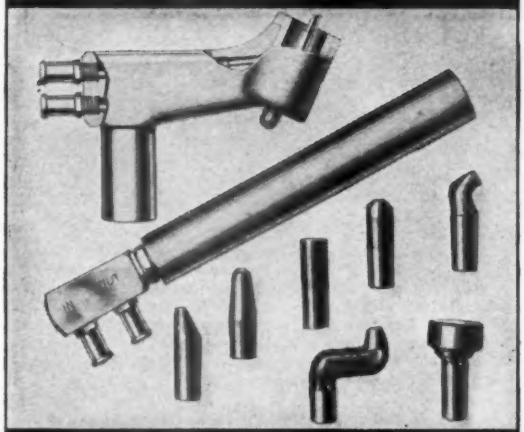
Red E Centers
Have High Speed Steel Points

The Ready Tool Company
Iranistan & Railroad Aves.
Bridgeport, Conn.

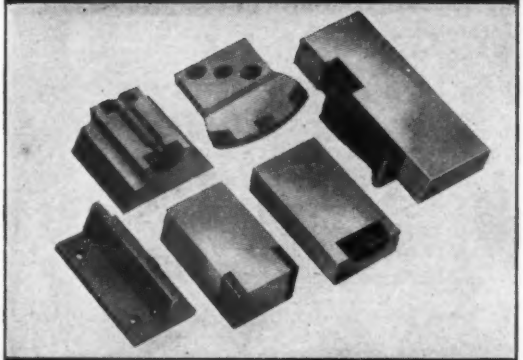
P. R. MALLORY & CO. Inc.

MALLORY

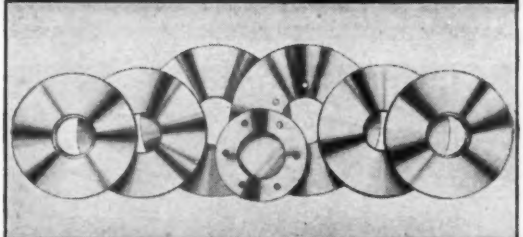
STANDARDIZED RESISTANCE WELDING ELECTRODES



SPOT WELDING TIPS AND HOLDERS



FLASH, BUTT, PROJECTION WELDING DIES



SEAM WELDING ROLLS

Speedier Production
Less Down Time
Better Welding
Lower Cost

Why Electrode Contour Counts

Correct design of a resistance welding electrode is important for several reasons. Whether tip or wheel or die, the electrode is a vital part of any resistance welding machine. It conducts current to the weld, and its shape and size determines current density in the material being welded. Also, the electrode must carry all the pressure needed for a sound weld. It must control the size of weld desired. It must conduct heat away from the outer surfaces of the weld . . . to prevent melting of the surface metal.

In spot welding aluminum alloys for aircraft parts . . . as one example . . . modern electrode design speeds output. For some years spot welding tips with a 7° conical nose have been favored. Today, although some fabricators still use this contour, radius faced tips with a radius of from 2″ to 10″ . . . depending on the thickness of sheets being welded . . . have been shown to produce sounder and more consistent welds. Also, radius faced tips are easily cleaned by hand, using abrasive paper.

HOW TO SPECIFY CORRECT ELECTRODE CONTOURS: Since there are pointed, radius, flat and offset contours for spot welding tips . . . and various designs of tip holders, of seam welding wheels, and of dies for flash, butt and projection welding . . . it's good policy to get expert advice. Mallory welding engineers will gladly help you in specifying the correct electrode material, design and cooling method for any resistance welding application.

Write us today for specific answers to your resistance welding problems. You may also want a free copy of the 79-page MALLORY RESISTANCE WELDING DATA BOOK . . . full of practical information on welding ferrous and non-ferrous metals.

P. R. MALLORY & CO., Inc.
INDIANAPOLIS INDIANA
Cable Address—PELMALLO

ABSORBO
OIL AND GREASE ABSORBENT AND FLOOR CLEANER

SAFE CLEAN FLOORS with this New Dry Compound!

Absorbo, when scattered over oily or greasy floors provides safe, sure footing. It's not necessary to sweep up re-occurring oil spills repeatedly, as Absorbo will retain oil or grease up to 45% to 50% of its weight. Prevent accidents and attendant work stoppages caused by slippery underfooting, by applying Absorbo to *your* floors.

Because of the sponge-like nature of its granules, and the absence of any gritty substance, Absorbo will not mar machine parts or surfaces. It may be used freely without abrasive action on all types of floors—wood, metal, concrete or linoleum.

Absorbo has been approved as a Class 1 non-combustible by Underwriters' Laboratories. Even when thoroughly oil-soaked it will resist burning and retard the spreading of fire. It eliminates the hazards of the highly flammable sawdust ordinarily used for oil-soaked floors.

Send coupon for 50 lb. bag with unconditional money-back guarantee.

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Dept. D2, 430 Riverside Avenue, Newark 4, New Jersey

Gentlemen: Send ..... 50 lb. bags of:
Absorbo Oil & Grease Absorbent and Floor Cleaner at $2.75 per bag, F. O. B. Newark 4, New Jersey.
Substantially reduced prices for quantities.

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Attention of:.....

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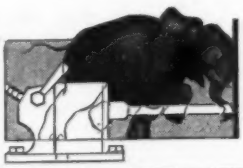
Feed Work Fast to Drill or Tap!

As-fast-as-you-can-step-on-a-button the sensational new Mead pneumatic WORKFEEDER delivers, holds, ejects small parts to be drilled, reamed or tapped. Accommodates stampings, castings, screw machine parts, etc. Adjustable to sizes up to 3". Foot or automatic control; operator's left hand is free to keep hopper loaded. Send samples of your jobs for quotation and delivery date. Write for new Mead AIR POWER Catalog describing "Mead Family" of air operated fixtures and devices. (Prompt delivery on most items.)



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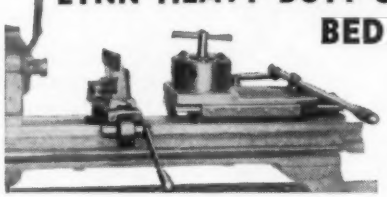

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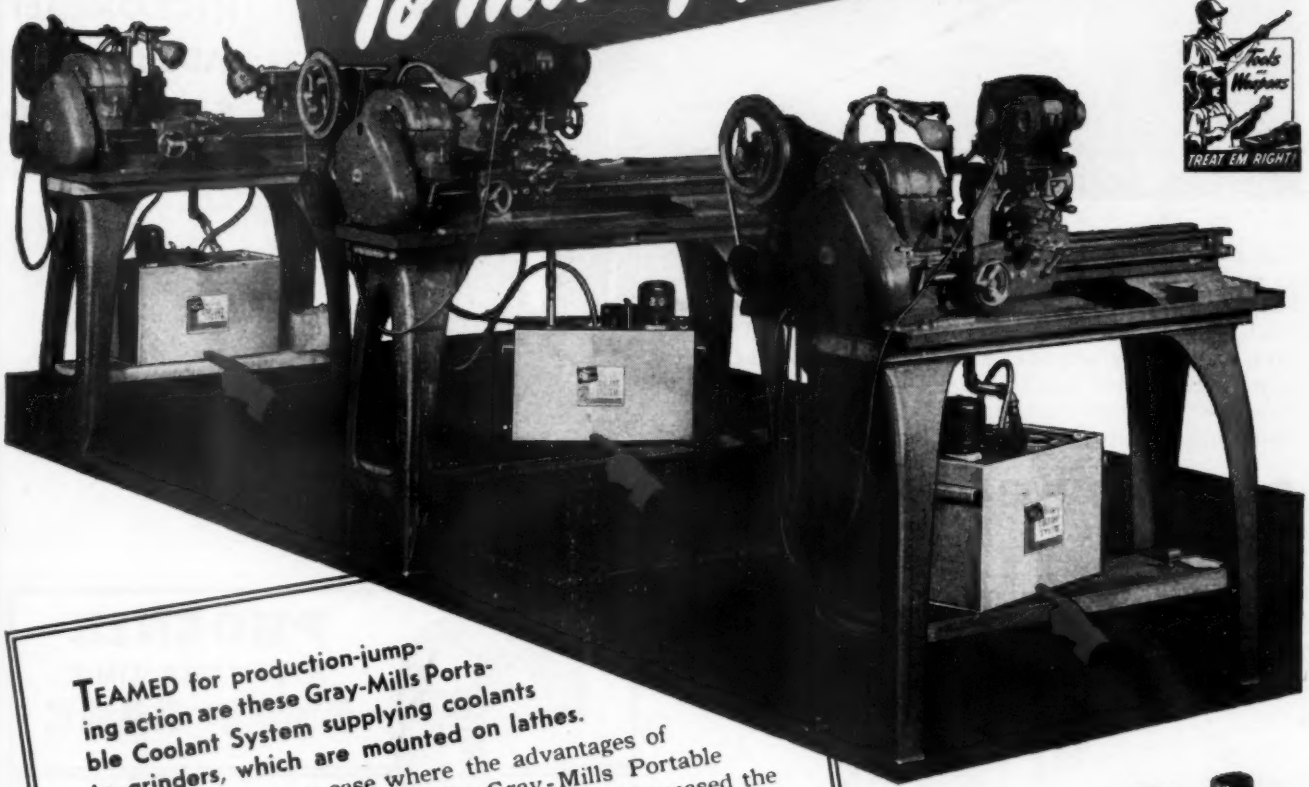
Supplying COOLANTS *To Thirsty Grinders*



TEAMED for production-jumping action are these Gray-Mills Portable Coolant System supplying coolants to grinders, which are mounted on lathes.

Here, again, is a case where the advantages of coolants are made possible by Gray-Mills Portable Coolant Systems . . . Gray-Mills Systems have increased the efficiency of hundreds of machines on operations like drilling, milling, sawing, grinding, honing, tapping, threading and cutting. They are quickly and easily set up to operate either as a permanent or temporary part of a tool. Sturdily built Gray-Mills Coolant Systems are available in both gear and centrifugal types, with baffles and pump screens, and with capacities from 40 to 3,000-gal. per hour controlled flow. Prices range from $39.50 to $189.50.

In Gray-Mills Portable Coolant Systems you have the quick, easy, economical way to apply coolants to small and old machines, or machines with inadequate coolant systems. Ask for a Gray-Mills demonstration. Call your distributor, or write direct. Send for Catalog.

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STANDARD HEAVY DUTY "A" SERIES
Large capacity tanks — forced settling baffles and screens — Capacities: centrifugal type up to 3,000 g. p. h. — gear type up to 165 g.p.h., pressures, 50 lbs. p. s. i.

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Capacities up to 130 g. p. h. — pressure, 30 lbs. p. s. i.

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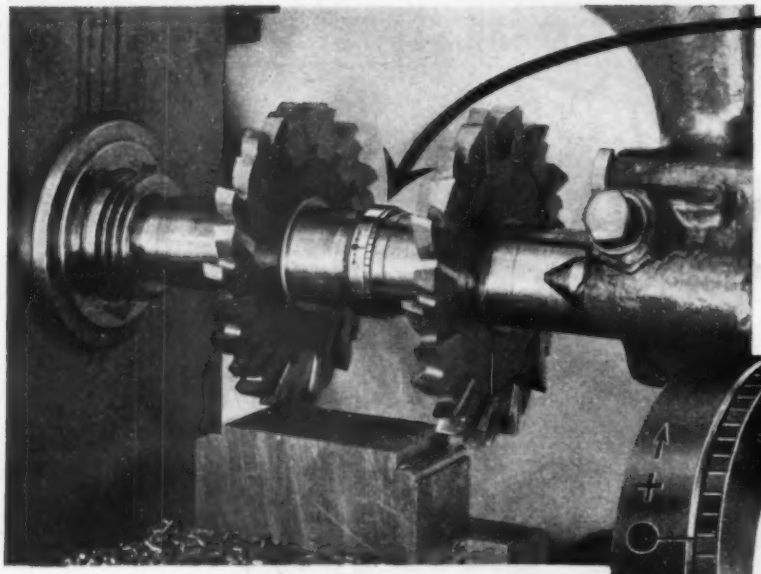
Use GRAY-MILLS COOLANTS . . . 5 types for most requirements—10 and 55 gal. containers — immediate delivery from your distributor or our plant.



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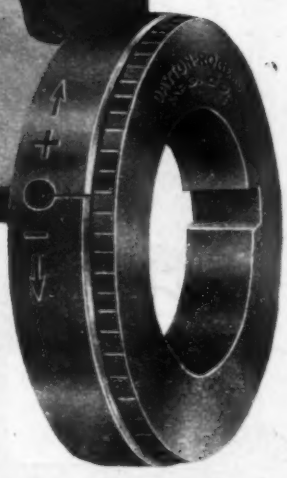

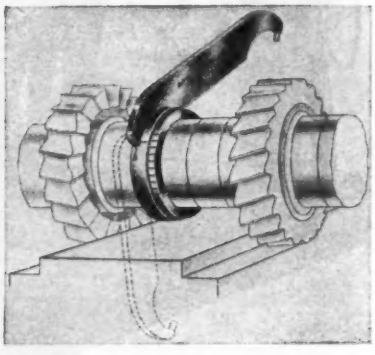

You need ruggedness plus precision adjustability on milling cutter spacing set-ups . . . and these new Micrometer Adjustable Spacing Collars give it to you! Built in all sizes for arbors from 7/8" to 6", they are readily adjustable to *split thousandths*. Low in cost, they quickly pay for themselves in improved accuracy and time savings. Write for bulletin giving prices and complete specifications.

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The Pioneer

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Almond Drill Chucks are made in types and sizes to fit all machine tools and portable drills.

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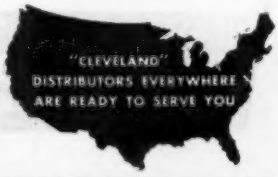

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. . . maintain quality under quantity demands

Card Regular Type High Speed Steel Cut Thread Pipe Taps are ideal tools for high production tapping in cast iron, malleable iron and other materials where chips break up, allowing the tap to properly clear itself.

Card Regular Type High Speed Steel Ground Thread Pipe Taps are recommended for high production tapping in cast iron, malleable iron and other materials where chips break up, allowing the tap to properly clear itself. Used where close accuracy and a high quality of production work is required.

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Send for the Card Catalog giving complete details.

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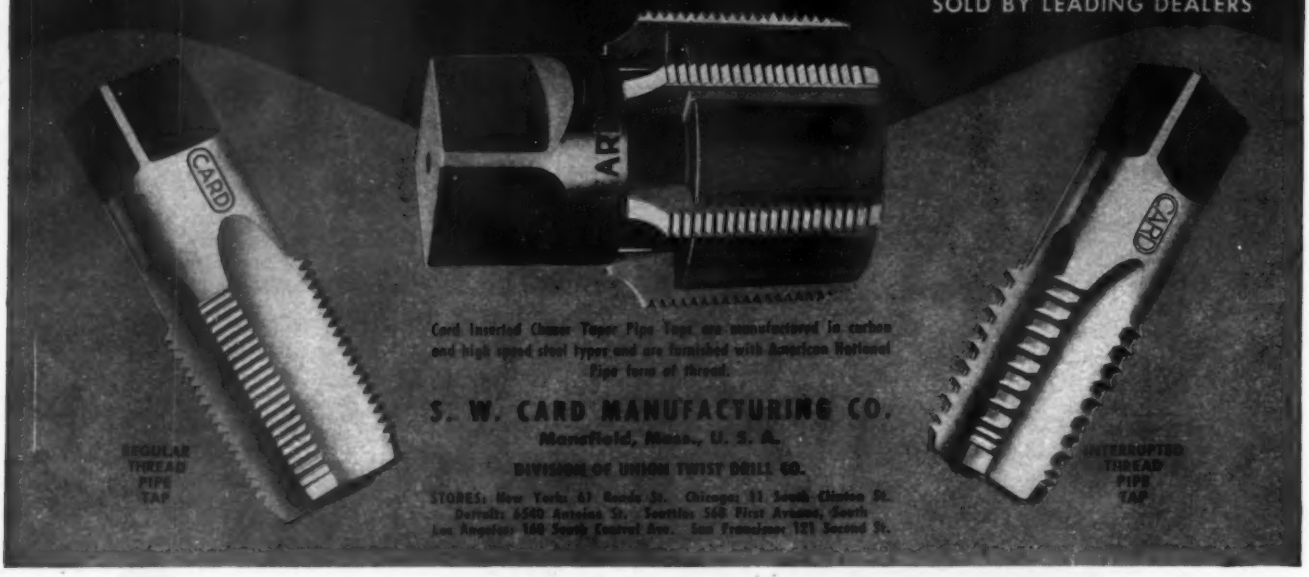

Card Inserted Chaser Taper Pipe Taps are manufactured in carbon and high speed steel types and are furnished with American National Pipe form of thread.

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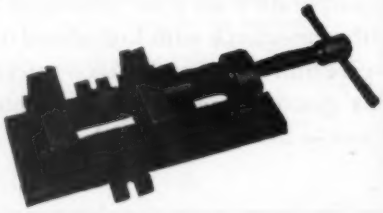
Write for copy of catalog "A" and name of your nearest dealer who can supply you.



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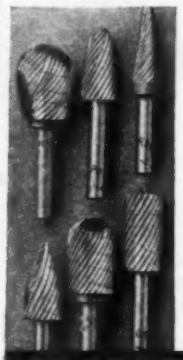

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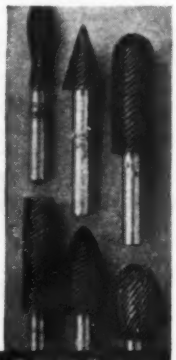
There is a GROBET ROTARY FILE in shape, size and coarseness of cut for every type of hard or soft metal, plastic, wood, etc. GROBET FILES do their jobs better and stay sharp longer.

Send for catalog DR, the most complete of its kind illustrating and describing GROBET Rotary Files, Diesinkers, Burs, Tube Burring Cutters, Chatterless, Countersink, etc.



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shopmen tell us about Bethlehem Carbon Tool Steels

Right through the war emergency shopmen have been turning in enthusiastic reports about the service they're getting from Bethlehem Carbon Tool Steels. They praise these steels chiefly on two counts:

We've had a lot of shopmen tell us this, by letter and by word of mouth. We'd rather have a good word about tool steel from a shopman than from anybody else, for he's the man who *knows*. He's working with the steel every hour of every day. When he says tool steel is good, *it's good.*

If work in your shop requires carbon tool steel, try Bethlehem Carbon Tool Steels. We think you'll like them.

BUY MORE WAR BONDS

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END SKIN IRRITATION HAZARDS from CUTTING OILS SOLVENTS and DEGREASERS WITH M·S·A

FEND-E

BARRIER PROTECTIVE CREAM

Specific protection for the machinist against skin irritations from contact with cutting oils and cooling compounds of low water content—carbon tetrachloride, gasoline, naphtha and other petroleum distillates and chlorinated solvents. FEND-E is easy to apply, rubs in dry on the skin, and is readily removed with soap and warm water at end of work period. Use FEND-E as safety assurance against irritated skin conditions among *your* shop workers!

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WRITE FOR DESCRIPTIVE
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Get the facts on the complete FEND line, plus detailed Application Chart of proper protection against many skin hazards.

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FEED IT FASTER with LITTELL
AUTOMATIC CENTERING
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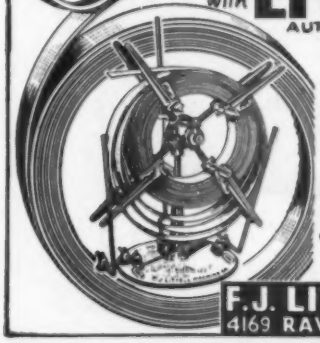

REEL off your stock for faster production with LITTELL Automatic Centering Reels, for a free-flowing loop of material to presses—hand or automatic feed.

Ask about the Littell line of Reels, Feeds (Roll, Dial, Magazine, Hopper), Straightening Machines, Air-Blast Valves, Pres-Vac Safety Feeders, etc.

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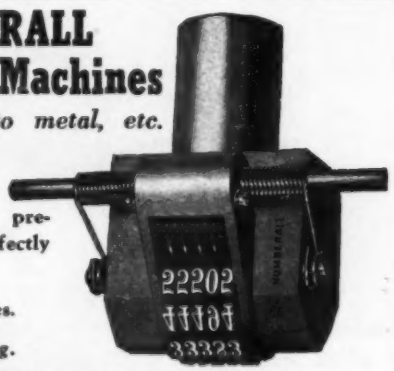
Numbering Machines
for stamping into metal, etc.
AUTOMATIC
MODEL NO. 50



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All sizes of figures.

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TANTUNG CUTTING TOOLS — DIES

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Save time and money—keep lead hammers in good condition at all times—easy to use—fast. Made in 7 sizes for hammers from 1 to 11 lbs. Write for details.
Also, Lead Hammers, sizes 1 to 15 lbs. always in stock.

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One of the World's Largest Builders of Electric Arc Welders

HOBART Simplified ARC WELDERS

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THE *Vernon*

VERTICAL MILL and JIG BORER

THE VERNON FEATURES

The Vernon features: 8 spindle speeds, 4 belt changes . . . ultra-precision, pre-loaded ball bearings . . . spindle nose carburized, hardened and ground . . . micrometer depth stop on quill . . . two quill feeds . . . headstock bore and quill honed for perfect fit . . . tapered gibs throughout . . . and many other advantages for accurate low-cost parts production.

For tool room precision on today's high-speed production lines . . . for fast, efficient and economical milling and jig boring on a hundred and one jobs . . . get a Vernon now!

A limited number of Vernons of 3-phase electrical characteristics are available for shipment within 24 hours of receipt of your order. Write for latest bulletins giving full details!

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Vernon Line of **HORIZONTAL MILLS, VERTICAL MILLS and JIG BORERS, SHAPERS and GRINDERS**

PREVENT CONTAMINATION – EXTEND TOOL LIFE

with the NEW BARRETT COMBINATION STERILIZER AND SEDIMENTOR for CUTTING OILS . . . .

Protect your operators against infection—insure more and better work from your cutting tools—by sterilizing your cutting oils and precipitating sediment *at the same time.*

The NEW BARRETT STERILIZER AND PRECIPITATOR combines these two operations in one piece of apparatus which can be depended on to handle both operations effectively, efficiently and economically. Sterilization is by heat and is a positive active operation in the line ahead of the supply tank. By locating in this position, contamination is intercepted before the cutting oil is conditioned for safe, bacteria-free reuse.

Because of the heat to which the oil is subjected during sterilization, the viscosity of the cutting oil is reduced, thereby encouraging precipitation of minute heavy particles. The sediment thus liberated settles out and drops by gravity to the bottom of the sterilizer where provision is made to scrape the precipitated solids from the conical bottom and clean them out.

By thoroughly and constantly sterilizing and effectively removing solid matter, the Barrett Combination Sterilizer and Sedimentor reconditions cutting oil for reuse; sterilized for safety's sake and abrasive-free for longer tool life.

Barrett Sterilizer and Sediment Precipitator arranged for fully automatic operation.

GET COMPLETE INFORMATION NOW

These units are available for floor, wall and post mounting and are furnished with manual semi-automatic or full automatic control as required. Send at once for detailed information on this timely Barrett development.

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LITTLEFORD MACHINE BASES

Fabricated Machine Bases are made by Littleford to fit your old machines, or those new machines now being designed for post war markets. Littleford Machine Bases are sturdy in construction and cost less to produce than cast bases. Send blueprints for prices.

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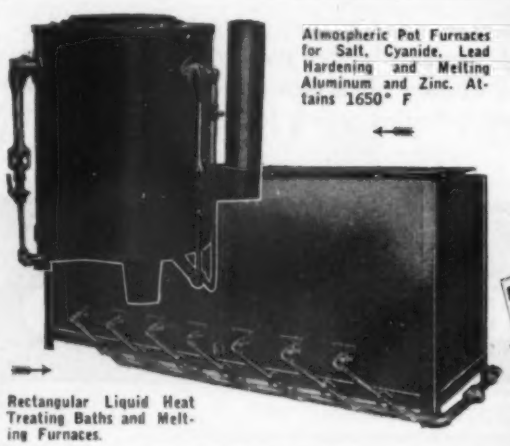

Atmospheric Pot Furnaces for Salt, Cyanide, Lead Hardening and Melting Aluminum and Zinc. Attains 1650° F

Rectangular Liquid Heat Treating Baths and Melting Furnaces.

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Heat Quickly to High Temperatures, without Blower, Power or other Auxiliary Equipment . . . just connect to your Gas Supply.

All "BUZZER" Industrial Gas Furnaces are rugged in construction, efficient in design, economical in operation and fully insulated.

The New BUZZER Catalog gives full details and information on wide range of models and sizes available for Heat Treating purposes, Burners and other equipment. Send for it today.

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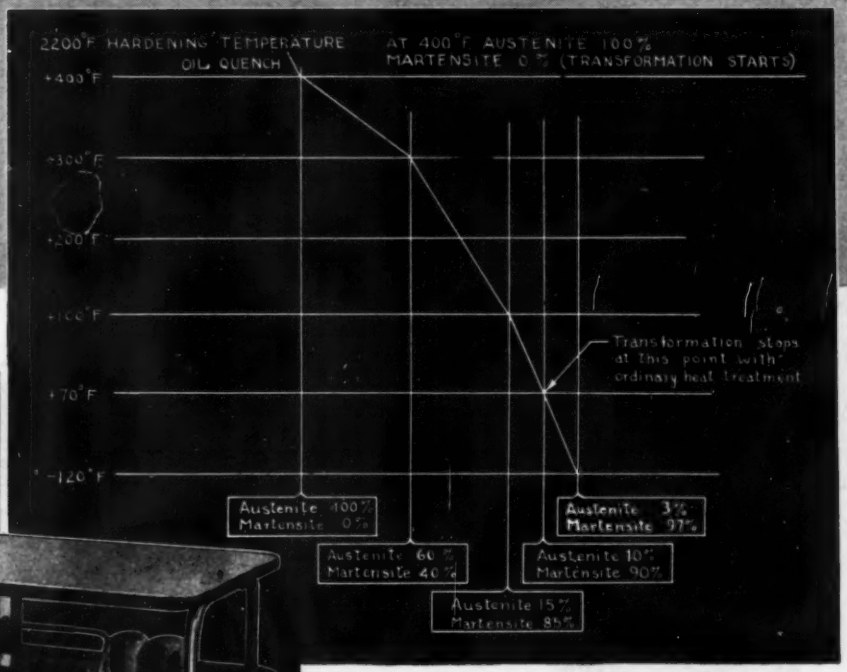
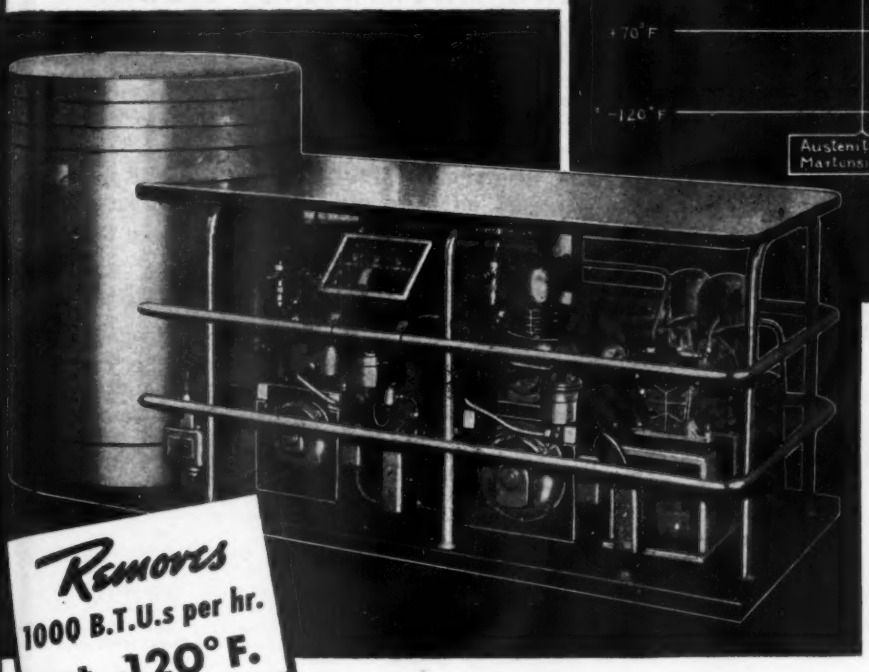
How Cold Treatment of Steel at -120°F. Results in Transformation of Austenite to Martensite

Provides Extra Hardness and Toughness...Relieves Stresses and Strains...Produces Uniformity of Hardness





Removes 1000 B.T.U.s per hr. at -120° F.

The above chart was developed by a prominent metallurgist showing the curve of transformation of Austenite to Martensite in metal at temperatures varying from 400° F. to −120° F.

● The Deepfreeze Cascade −120° F. Industrial Chilling Machine is finding widespread application in the hardening and stabilization of metals by cold treating at temperatures of −100° F. to −120° F. It has been found that the proper cold treatment will produce a uniformity of hardness that clearly indicates that most stresses and strains have been relieved.

The treatment of metals by the chilling method is as yet too new to understand its full possibilities, but recent tests reveal that chilling of steel at −120° F. in a Deepfreeze immediately after quenching results in a greater transformation of the retained Austenite to Martensite. With ordinary heat treatment the transformation stops when the steel reaches room temperature, leaving approximately 10% Austenite content. However, chilling to −120° F. in a Deepfreeze results in a nearly complete decomposition of the retained Austenite.

Deepfreeze Cascade -120° F. Industrial Chilling Machine for the Shrinking, Testing and Treating of Metals . . .

In addition to the treatment of metals, Deepfreeze Chilling Machines are finding many other money saving applications in a wide variety of industrial fields. The Cascade −120° F. Industrial Chilling Machine shown above has the chilling capacity for high production metal chilling of any part where large quantities of heat must be removed fast. It is adaptable to almost any metal chilling job. Let Deepfreeze engineers assist you in the application of cold treatment to your products.

Example Procedures in the Treatment of Steel by Deepfreeze Chilling Method

REX M.M. HIGH SPEED TOOL STEEL

Heat Treatment (*Ordinarily Used*)	Heat Treatment (Deepfreeze Method)
Pre-heat.....1550° F.	Pre-heat.....1550° F.
Hi-heat.....2160° F.	Hi-heat.....2160° F.
Quench.....(air)	Quench (air) to +120° F.
Draw.....1025° F. (2 hours)	Deepfreeze to −120° F. (3 hours)
Cool to room temperature	Warm to atmosphere in air
Draw.....1025° F. (2 hours)	Draw.....1025° F. (2 hours)
	Cool to.....+120° F.
	Deepfreeze to −120° F. (3 hours)
	Warm to atmosphere in air
	Draw.....1025° F. (2 hours)
	Cool to.....+120° F.
	Deepfreeze to −120° F. (3 hours)
Rockwell Showed 63-64 C.	*Rockwell Showed 65-67 C.*

NOTE: If the Draw is permitted to go over 1025° F. it will be necessary to repeat the Deepfreeze chilling process.

WATER HARDENED DIE STEEL—The following method is that found best adapted for cold treating water hardened die steel.

1—Heat to 1500° F. (or usual method).
2—Quench at 75° F. (or usual method).
3—Immerse at once into Deepfreeze at −120° F.
4—Draw as usual (if drawing temperature exceeds 875° F. then again immerse in Deepfreeze at −120° F.)

FINISHED PRODUCTS—For the cold treatment of finished products not manufactured by the user, the following procedure is successfully used by many firms with Deepfreeze equipment.

1—Heat to 300° F. in tempering furnace (if furnace is not available use boiling water at 212° F.)
2—Cool to atmosphere.
3—Immerse in Deepfreeze at −120° F.
4—Warm to atmosphere.
5—Repeat cycle 5 to 6 times.

Free Additional Information

For additional information on Deepfreeze equipment send for free copy of bulletin with complete details, specifications, and listing other uses.

Deepfreeze

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NORTH CHICAGO, ILLINOIS

Industrial Chilling Equipment for Shrinking, Testing, Hardening and Stabilizing Metals

Division of Motor Products Corporation, Detroit, Michigan

WRIGHT
Improved
High Speed
HOISTS

WRIGHT MAKES IT POSSIBLE TO TRUCK ON THE CEILING

No—it is *not* done with mirrors. It is done with either **WRIGHT** Improved High Speed Hoists, **WRIGHT** Speedway Electric Hoists, or **WRIGHT** Cranes.

WRIGHT material-handling equipment is tailor-made for *your* production problem. It doesn't matter whether your product is paper or locomotives, textiles or tanks, there is a **WRIGHT** hoist or crane that can handle it safely, rapidly, and economically.

In your local classified telephone book you will find the name of the **WRIGHT** distributor. He is a good man to know. He can advise methods for both speeding production and saving money.

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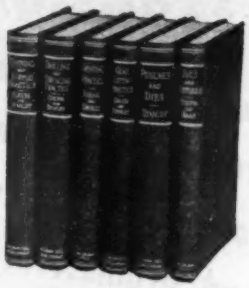

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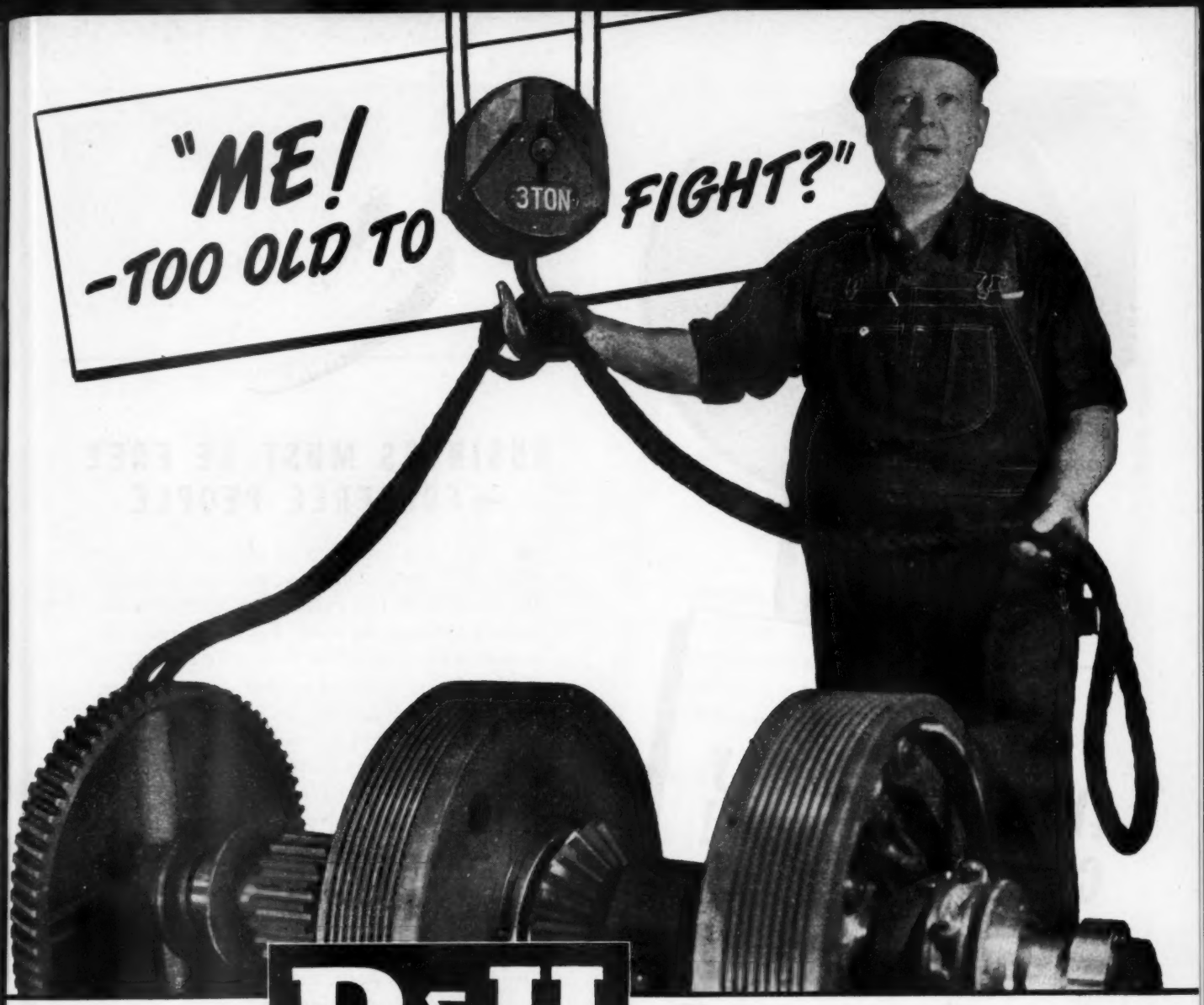

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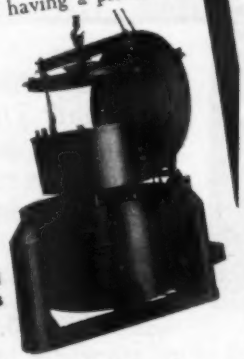

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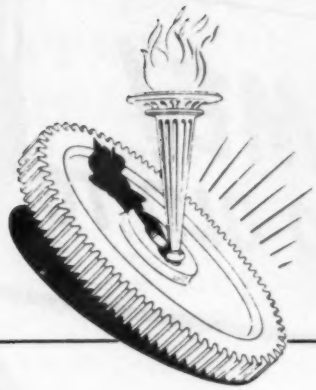

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★ We in this country have enjoyed the "Four Freedoms" for so long that perhaps we forget the existence of these Freedoms—and their maintenance through the years—has been largely the economic result of a Free Enterprise System.

When business is free to plan ahead, to dare, and to risk with faith in the future—with faith in the possibility of a reasonable profit, all the people benefit! When the imagination and inventive genius of industry can forge ahead with new production methods, develop new products, and invade new markets — then mass employment and the Four Freedoms are assured.

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Industrial progress promotes Freedom, when industry in turn is free of hampering government regimentation. Government must *encourage* industrial progress, not handicap its development. Repression is foreign to the conception of free people. *And, because appreciation comes only from knowledge and understanding, we in Industry must explain these benefits of Free Enterprise to those who may not understand them today.*

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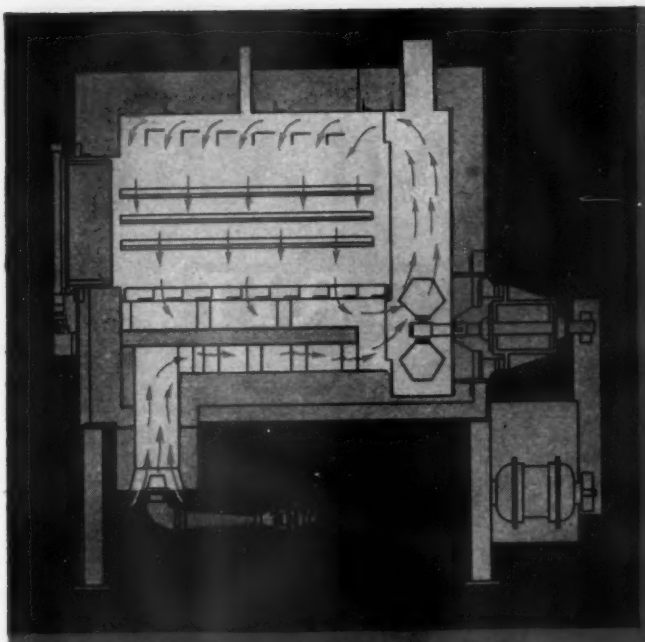
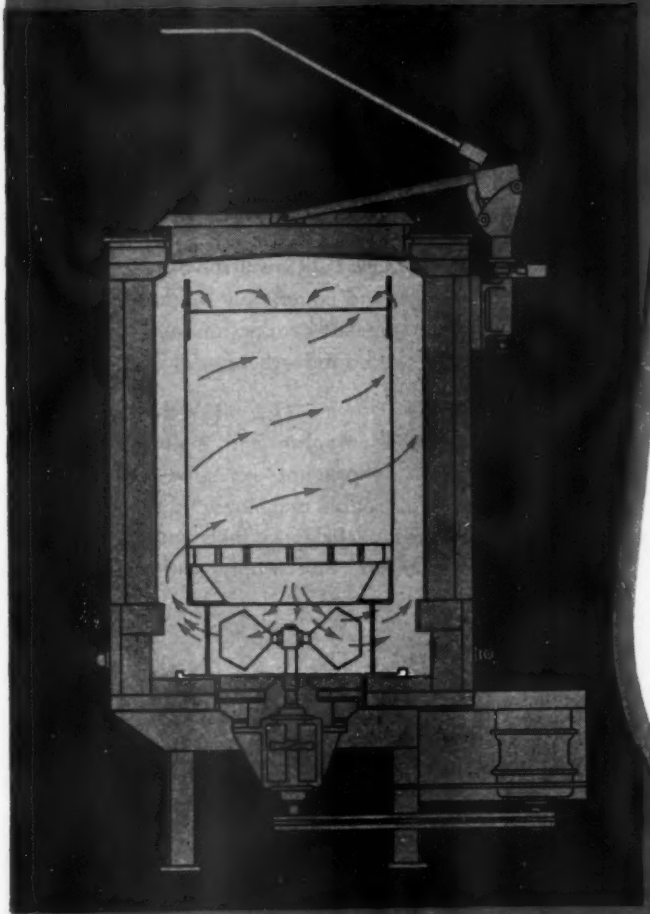


The circulation of hot gases in Surface Combustion convection furnaces is shown in these two illustrations. Above is the horizontal or oven-type furnace; below, the vertical or pit-type.



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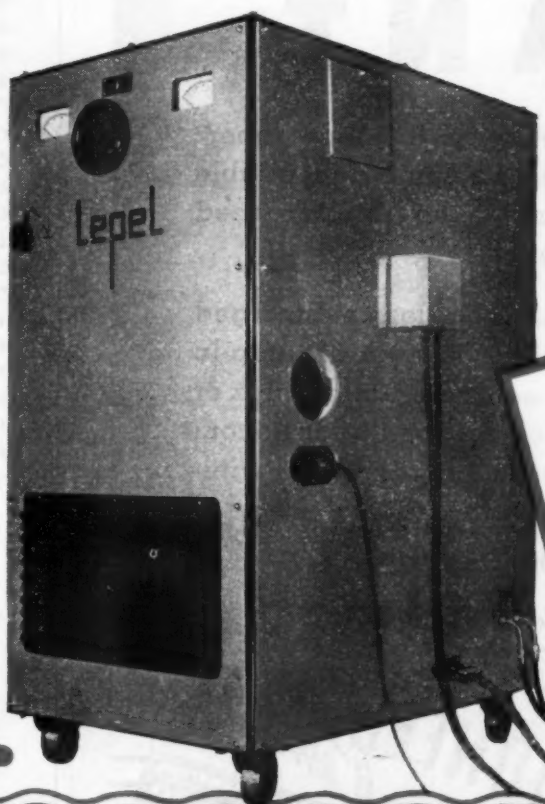

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This new Model MVA is a seal-less, submerged type of pump for use either in coolant sump in base of machine or in separate tank. Chips or dirt that will pass through the grille at bottom of pump will readily pass through pump without injuring it.

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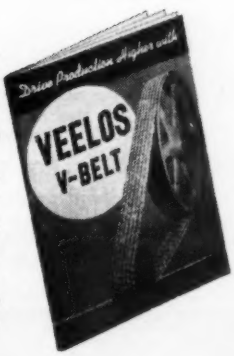
The link's out! The belt's shorter! That's really all there is to Veelos readjustment.

VEELOS PROVIDES SIMPLEST ... SPEEDIEST READJUSTMENT OF ANY V-BELT!

When the belt of your trousers needs to be tightened or loosened, you simply take it in or let it out a notch. The readjustment of Veelos is as simple and practical as that! You lengthen or shorten Veelos simply by adding or removing links. Tension is easily maintained to end slippage without the need to move motors or install new belts.



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Veelos is made in all standard sizes (3/8", A, B, C, D, E) ... fits all standard V-belt grooves

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THE LINK
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ADJUSTABLE TO ANY LENGTH
ADAPTABLE TO ANY DRIVE

MANHEIM MANUFACTURING & BELTING CO.
MANHEIM, PENNSYLVANIA

$135.00 A DAY SAVED

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Any unskilled person can operate an American Chip Wringer. Let us show you how much money and valuable oil your plant will save with an American Chip Wringer... WRITE!

** Low viscosity oil which drains freely before chips reach Chip Wringer.*

American Chip Wringers are available in following models:
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Model 26
Model 30
Model 40
Model 48

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The AMERICAN LAUNDRY MACHINERY COMPANY
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Don't be fooled, then, when the volume of abrasive dust and grit seen flying from buffers and grinders appears small. It's the dust you DON'T see that does the damage.

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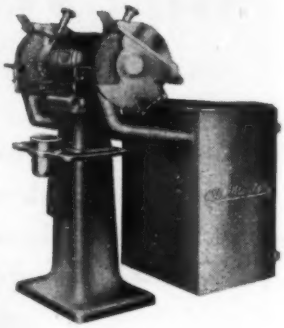
*Micron—1/1000 of a millimeter.



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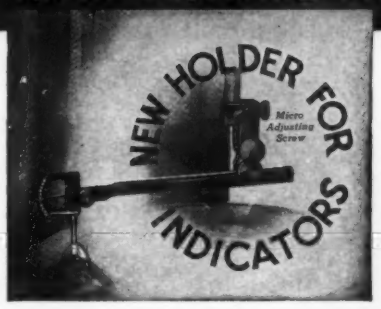
Save 60% TIME spent adjusting indicators



For Jigborers, Boring Mills, Milling Machines. It fits all popular indicators. The above illustration shown complete with extension bar.

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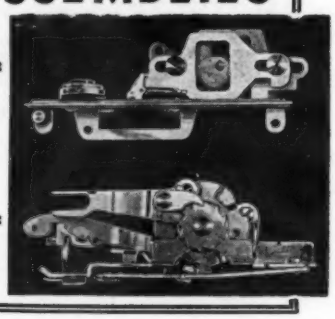

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MATCH PLATE WORK A SPECIALTY
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Departmental Staff
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330 West 42nd St., New York 18, N. Y.

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-(ORIGINATED BY US)-
Reg. U. S. Patent Office

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"RE-MANUFACTURED" represents what the word implies. It means the dis-assembling of a machine for complete inspection. It means the replacement of worn parts, resurfacing, refinishing and re-assembling, all carefully done by competent, trained mechanics. It means final testing under power, for both operation and accuracy, to assure the same performance available in a new tool.

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Only Machines for War Production Accepted

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Location New York State. Excellent working conditions that have prevailed over many years combined with a modern shop and equipment should appeal to the man we are looking for. He should have an engineering background and preferably have practical machine shop training. He should have the ability to plan and direct quality production and secure results harmoniously and economically.

Business is now operating 100% on war work but has wide line of nationally known products for postwar markets.

This is not a temporary connection for the war duration. It is a permanent association with a congenial and progressive organization with unusual opportunities for the right man able and willing to do his part in meeting the postwar competitive era for which we are preparing.

All correspondence will be considered in confidence, therefore please give details of experience with whom, and for how long, age, and other essential information.

P-695, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

Permanent Positions for Automatic Screw Mach. Set-Up Men

Openings for qualified men on aircraft work. Experience with Greenlee machines preferred. Must be citizens of U. S. A. with birth certificate or naturalized citizens with naturalization papers. Apply in person for interview, or write, stating qualifications, marital status and draft status. If your letter warrants an interview, transportation expenses will be reimbursed. Do not apply if engaged in war work at higher skill.

JOHN A. ROEBLING'S SONS CO.
629 South Clinton St., Trenton 2, N. J.

ROEBLING

WANTED

PRODUCT ENGINEER

Graduate electrical or mechanical engineer. Top notch man in Product Development for responsible position with electrical small appliance manufacturer located in the midwest. Write full details—Give age, experience and salary expected in first letter. Write in confidence as our staff knows of this ad.

P-696, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago, 11, Ill.

WANTED

First Class Engineer

with practical experience in Machine Tool Design. One who has something to offer for the Post War Trade and with Horizontal Boring Machine experience preferred.

P-674, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

WANTED

MACHINE TOOL SALESMAN

With machine tool knowledge to travel on road. This position not only for duration but will continue after the war.

Give all information and acquaintances in letter. Reply

SW-698, AMERICAN MACHINIST
330 West 42nd Street New York 18, N. Y.

WANTED

TWO EXPERIENCED MACHINE DESIGNERS

Large Pennsylvania Machine Tool Manufacturer has permanent positions for first class designers.

Send complete outline of education, experience and qualifications.

P-700, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

POSITIONS VACANT

These Positions Vacant advertisements are published subject to agreement by the advertisers not to consider applicants now employed on war work unless they obtain written release from present employer.

MECHANICAL DRAFTSMAN with practical mechanical experience in blanking, drawing and forming dies for sheet aluminum products in defense work by old established company in Central West; give experience and full particulars. American Machinist, P-667, 520 N. Michigan Ave., Chicago 11, Ill.

TOOL MAKERS for defense plant in Central West; give experience and full particulars. American Machinist, P-668, 520 N. Michigan Ave., Chicago 11, Ill.

POSITIONS VACANT

MACHINE DESIGNER WANTED—Experienced on the design of special machinery and machine tools. This is an excellent opportunity for a first class man interested in a steady position in New England. Only men 35-55 with a record of successful achievements will be considered. In replying furnish complete information preliminary to a conveniently arranged interview. American Machinist, P-685, 330 W. 42nd St., New York 18, N. Y.

ENGINEER WANTED to take charge of methods department for machinery manufacturer in Portland, Oregon, now in war work but manufacturing same product as during peace time. Must have had experience in time studies, motion studies, engineering of methods, establishing wage incentive systems, etc. Reply should give full details of education, experience, age, etc. American Machinist, P-690, 68 Post Street, San Francisco 4, Cal.

MAN WANTED with manufacturing experience and sales ability to take charge of office in East or Middle West and have responsibility for securing materials and placing sub-contracts for a Pacific Coast Company. State education and experience in first letter. American Machinist, P-691, 68 Post Street, San Francisco 4, Cal.

EMPLOYMENT SERVICE

SALARIED POSITIONS—This advertising service of 33 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details. R. W. Bixby, Inc., 266 Delaware Bldg., Buffalo, N. Y.

(Continued on opposite page)

MACHINE TOOL AGENT

WITH REPRESENTATIVES THROUGHOUT THE WORLD INTERESTED IN SECURING NEW LINES FOR EXPORT.

Advise All Particulars in First Letter. Reply

RA-697, AMERICAN MACHINIST
330 West 42nd Street New York 18, N. Y.

WANTED
IDEAS, INVENTIONS or PATENTS

A company with a nationally known product would like to consider ideas and inventions suitable for post-war use in the industrial and commercial field of applying and dispensing lubricants, such as pumps, point to point, centralized lubrication, etc. Also hydraulic, vacuum, or pneumatic actuated mechanisms, pistons, valves, etc., as used in the Aircraft and Automotive field. Also passenger and industrial elevators, automatic leveling devices, controls, etc., and similar items such as portable lifting and stacking trucks or mechanisms used about factories, etc.

★ ★ ★

Before sending us any information, please write for detailed instructions, Dept. NP6, L. W. Ramsey Advertising Agency, Davenport, Iowa

INDUSTRIAL PLANT

To Be Sold to Highest Bidder, *on Premises, Easton, Pennsylvania, Tuesday, Nov. 19th, 1943, at 1:00 P.M.*

Formerly occupied by the Hawley Down Draft Furnace Company and located at Hellerton Road and Valley Avenue, Easton, Pennsylvania. Railroad Siding on Main Lines of L.V.R.R. and C.R.R. of N.J. with spur coming into main building.

Ideally suited for any type of manufacturing where railroad siding and overhead traveling cranes are essential.

Total land area 110,000 sq. ft. Steam heated Machine Shop and Office, modern steel one-story buildings, daylight construction, 60' by 180', and 60' by 100'; Office 60' by 60'; Garage 30' by 50'; two Core Rooms each 20' by 50'.

Inspection daily on premises up until time of sale. For further information contact:—

GREATER N.Y. CONTRACTORS MACHINERY & EQUIPMENT CO., INC.
258 - 23d STREET, BROOKLYN, N. Y. Tel. South 8-4900

(Continued from opposite page)

POSITION WANTED

MANUFACTURING EXECUTIVE—Plant Manager — General Superintendent. Technically trained mechanical engineer and industrial manager. 12 years managing plants in charge of personnel, cost accounting, production engineering, production control, plant engineering and inspection. 22 years manufacturing experience in—heavy machinery, precision machine tools, high quality diesel and aviation specialties. Inherently mechanical. Successful records for high production and low costs through—time-study, performance standards, standardized tooling and methods, incentive systems. Good on labor relations. Salary $7,000. 42 years old. Immediately available. American Machinist, PW-671, 330 W. 42nd St., New York 18, N. Y.

SELLING OPPORTUNITIES
OFFERED—WANTED
Selling Agencies—Sales Executives Salesmen—Additional Lines

OFFERED

SMALL TOOL SALES AGENT or agency wanted to handle adjustable limit snap gages. Liberal commission, and exclusive territory. Refer to American Machinist, SW-683, 330 W. 42nd St., New York 18, N. Y.

WANTED

ADDITIONAL LINES wanted by well established Manufacturers Agent with fifteen years successful experience and extensive and valuable list of customers and their mechanical men and buyers. Exclusive sale of light machinery and tools of exceptional merit desired. Territory covered by our practical Tool Service men, Southern Michigan and Northwestern Ohio. American Machinist, RA-692, 68 Post Street, San Francisco 4, Cal.

EXCLUSIVE REPRESENTATION wanted by well established machine tool dealer in New York-Philadelphia territory for one additional line of production machinery automatic or semi-automatic type preferred. American Machinist, RA-699, 330 W. 42nd St., New York 18, N. Y.

PATENT ATTORNEY

PATENTS, COPYRIGHTS, Booklet, "General Information Concerning Inventions and Patents" and "Fee Schedule" sent without obligation. Established 1915. Lancaster, Aliwine & Rommel, Suite 453, 815-15th St., N. W., Washington, D. C.

CONTRACT WORK

WORK WANTED—For advertisements of work wanted see page 354.

NEW INVENTIONS WANTED

Mechanical and electrical devices for post-war manufacture and sale. Either new ideas, or improvements upon present methods.

P. O. Box 217, Denville, N. J.

FOR SALE
BLACKSMITH AND MACHINE SHOP

Fully equipped, block and part frame building in good condition, 3800 sq. ft., 1000 sq. ft. upstairs. Enough work for 5 men the year round. Also dwelling property and 3 lots.

HOCHSTETLER BROTHERS
Mt. Hope, Ohio

Leading firm of British Engineers with Continental Sales Organisation are prepared to negotiate for
EUROPEAN POST WAR RIGHTS
of manufacturers of
Light and Medium Engineering Units.
Full particulars of confidence to Messrs. Churchill, Clapham & Co., Solicitors, 1 Broad Street Place, London, E. C. 2.

20′ BARNES HONING

IMMEDIATE DELIVERY FROM OUR STOCK

PRACTICALLY NEW

No. 6 BARNES HYDRAULIC HORIZONTAL HONER

6″ diameter capacity.
20′ spindle stroke.
Table working surface 22′ x 40″.
Maximum swing 40″.

This machine is complete with extra hones, blades, cradle supports, extension bars, Vickers hydraulic pump and coolant motor and pump.

We invite your personal inspection. ***Wire — Write — Phone***

LOUIS E. EMERMAN & COMPANY
MACHINERY
875 W. 120th STREET **CHICAGO 43, ILL.**

LATHES
42″ x 30′ American Grd. Hd. Lathe, A.C. M.D.
36 x 30′ LeBlond Geared Head M.D. Q.C.
26″ x 10′ Niles, Cone, Q.C.
18″ x 8′ Lodge & Shipley Q.C.
14″ x 6′ American Lathe, 4 step cone, Q.C.
20″ x 9′ Rahn Larmon, Cone, Q.C.

GRINDERS
Fitchburg Spline Shaft Grinder.
#65 Heald Cylinder.
Lees Bradner Gear Grinder.

GEAR MACHINERY
18″ Gleason Bevel Gear Generators.
6″ Bilgram Bevel Gear Generator.
#4—36″ B & S Automatic Gear Cutter.
Lees Bradner Gear Grinder.
#3-26″ Brown & Sharpe Gear Cutter.
#645 Fellows Gear Shaper, Cullman M.D.

PLANERS
72″ x 60″ x 28′ Pond 2 heads, Belt drive.
24″ x 24″ x 6′ Gray Planer.
26″ x 26″ x 8′ Woodward & Powell, 2 Hds.

RADIAL DRILLS
2½′ American Plain, M.D.
8′ American Sensitive.
3′ American Plain.
3′ Cincinnati Bickford Plain Radial Drill.
4′ Carlton Plain Radial Drill.
6′ American Triple Purpose Plain Radial.

MISCELLANEOUS
12 Ga. 30″ Throat Quickwork Shear, M.D.
14″ Niles Slotter.
1500# Bell Steam Hammer.
#4 Cincinnati Vert. High Power Mill M.D.

CINCINNATI MACHINERY & SUPPLY CO.
217 East Second Street, Cincinnati, Ohio

REBUILT PLANERS AND LATHES
AVAILABLE FOR IMMEDIATE INSPECTION AND DELIVERY

1—48″x36″x18′ Detrick & Harvey Openside Planer
2—42″x42″x12′ Pond Heavy Duty Double Housing Planers
1—36″x36″x12′ Betts Heavy Duty Double Housing Planer
1—36″x36″x10′ Gray Heavy Duty Double Housing Planer
1—24″x24″x 6′ Gray Double Housing Planer
1—24″x12′ Putnam Engine Lathe
1—20″x10′ Flather Engine Lathe
1—20″x 6′ Flather Engine Lathe
1—18″x 6′ Monarch Engine Lathe

ATLANTIC MACHINERY CORPORATION
149 BROADWAY **NEW YORK, N. Y.** **WOrth 2-0662**

UNUSUAL VALUES

Belt Cutter 1″ capacity, 3 spindle
Brake Robinson 5′ toggle
Compressor, 120 Schramm, portable
Drill, new 10″ Buffalo bench
Drill, ceiling suspended, unlimited drilling area
Drill Press, 20″ three spindle Barnes
Drill, six-spindle Henry & Wright, 12″ overhang
Drill, two spindle sensitive, #1 Morse taper
Grinder #20 Bryant deep hole internal
Grinder 60″ plate
Grinder, Sellers Tool
Lathe, 14″x12′ Lodge-Shipley grd. hd. s.s. mtr. dr.
Lathe, 24″ x 18′ Steptoe-McFarlan
Motors—new ½ to 30 HP-3 phase ball bearing
Pipe Machine, 6″ Merrell
Press #8-7 Zah-Hahnemann straight side grd.
Punch & Shear ⅝″ capacity Rock River
Punch & Shear, two ½″ capacity
Threading Machine #0 Webster & Perks
Turret Lathe L & D brass, cross slide turret
Vacuum Cleaners, heavy duty for shop use
THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

MISCELLANEOUS MACHINES

12 x 18″ Cinci. Plunge Cut Grinder, m.d. with 9″ face wheel, rebuilt.
3′ Carlton Sensi. Radial with tapping att.
3′ 9″ col. American Enclosed Head Plain Radial Drill
4′ Hammond Sensi. Radial, with tapper, m.d.
6′ Niles Plain Radial Drill, m.d., rebuilt
2-spindle DEMCO High Speed, B.B. Drill, hand feed, ⅜″ cap.
Gisholt Tool Grinder, arr. for m.d.
Oliver Tap Grinder, m.d.
12″ Double End Warner & Swasey Key Lathe

STRONG, CARLISLE & HAMMOND CO.
1392 West 3d St. **Cleveland, Ohio**
2632 East Grand Blvd. **Detroit, Mich.**

POWER PRESSES
BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

NILES-BEMENT-POND Horizontal Boring, Drilling & Milling Machine, 4½″ bar, duplex control, table-type, with auxiliary table, motor drive.

LANDIS 8″ to 18″ inclusive—Pipe Threading Machine, gear box, single pulley drive.

ALSO MANY OTHER TOOLS

ALEX ZEEVE & COMPANY
2289 Woolworth Building **New York, N. Y.**

Before you buy, sell or exchange machinery of any kind contact us first.

PAUL'S MOTOR & MACHINERY SUPPLY
6111 Vermont Ave.
DETROIT, MICH.

IN STOCK!!!

LATHES

Putnam 26" x 12' Heavy Duty Screw Cutting Engine Lathe, QCG.
LeBlond 21 x 10 Quick Change Gear Lathe, motorized.
Reed 32" x 16' Plain Change Lathe, Light Pattern.
Rockford 14 x 6 Quick Change Gear, motorized.
Champion 18" x 12' Quick Change Gear Lathe.
Superior 18" x 8' Heavy Duty Quick Change Gear.
LeBlond 14" x 6' Toolroom Quick Change Gear Screw Cutting Lathe, with taper attachment, drawbar collets and two chucks.
Rahn-Mayer 18" x 10' bed Standard Change Gear Screw Cutting Engine Lathe Price: $850.00.
Handey 14" swing x 5' bed Quick Change Gear Cone Dr.

TURRET LATHES

Jones & Lamson 3 x 36 Chucking Machine, Serial #15,451, single pulley drive.
Jones & Lamson 3 x 36 Chucking Machine, Serial #15,347.
Jones & Lamson 2¼ x 24 Motorized 3 phase, 60 cycle, 220 volt service, complete with bar equipment, full set of collet pads, good condition.

FURNACE

1—W. S. Rockwell Revolving Annealing Furnace. Model 701.

HAMMERS

1—1100# Bement & Miles Steam Forging Hammer.
No. 6½ Rochester, High Speed Riveting Hammer.
No. 5½ B Rochester High Speed Riveting Hammer.
High Speed Riveting Hammers—4A, 3A, HD, 2A, HD, 1AA.
50# Fairbanks Blacksmith Power Hammer.

BORING MILLS

24" Bullard Vertical Turret Lathe Rapid Production, motor drive.
3½" Rochester Floor Type Horiz. Boring Mill, M.D.

LOCOMOTIVE CRANE

Ohio Locomotive Crane, 22½ tons, 8 wheel, 50' boom, ASME boiler, 150# pressure. PRICE: $9000.00.

GRINDERS

No. 2 and No. 3 Brown & Sharpe Cutter Grinder.
Gorton, double end Disc Grinder, 18" discs.
Greenfield Internal Grinder #12 Hydraulic, motor drive, capacity 15" swing, grinds automatically ⅝ to 5" diameter, 4" deep, equal to new.
36" Blanchard #16 Vertical Rotary Surface Grinder, late model.
Heald 16" Rotary Surface Grinder #255, motorized.
Pratt & Whitney Vertical Surface Grinder 14" x 36', Model B, ball bearing, motor drive.
#2 Brown & Sharpe Universal Cylindrical, belt drive.

BX CABLE COILING MACHINES

No. 1 and No. 2 Sleeper & Hartley BX cable coil. mach., ⅜ and ½ in. cap. Last used for speedometer cable. Complete.

DRILLS

Leland-Gifford 2-spindle, No. 2 M.T., high speed, ball bearing Drill Press, power feed.
Allen single-spindle, high speed, ball bearing, 8" overhang Drill Press, table 14 x 14.
Avey single-spindle, No. 2 M.T. Toolmakers Drill Press, two tables, like new.
Henry & Wright 6 spdle #2 M.T. High Speed, B.B.
RADIAL DRILL—Bickford 7' arm, 15" round column, gear box motor drive.
Prentice 4-spindle No. 2 M.T. High Speed Ball Bearing Drill, rebuilt.

DRILLING MACHINES

Fox No. 15 H Multiple Spindle Drilling Machine, hydraulic feed, drilled for 54 spindles and equipped with 32 No. 1 Morse taper spindles, 43" x 23" rectangular head, Serial No. 1065, motor driven, 10 H.P., 3 phase, 60 cycle, 440 volts.
Fox No. D31 mult. spindle drill. mach. Drilled for 32 spindles and equip. with 16 No. 2 Morse taper Pwr. fd., 17" x 34" bd. Ser. No. 626, m.d. 10 H.P., 3 ph., 60 cy., 220 v.
Natco No. 12 mult. spindle drill. mach. Single pulley, B.D., Drilled for 16 Spindles and equip. with 6 No. 2 Morse taper. Power feed.

GEAR SHAPERS

2—#612 Fellows—Late type.
1—No. 3 Brown & Sharpe Spur Gear Cutter.
1—No. 13 Brown & Sharpe Spur & Bevel Gear Cutter.

SHAPERS

26" Cincinnati Triple Geared Shaper, Friction Drive.
20" x 20" x 36" N-B-P Shaper-Planer, Arranged Motor Drive.
16" Cincinnati Back Geared, cone drive.

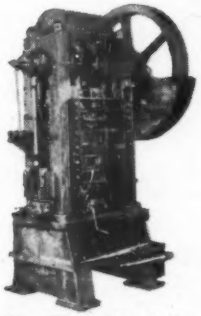
COIL STRAIGHTENERS

No. 5-18½ Littell Single Rack & Pinion Feeding and Straightening Machine takes stock 18½" wide up to 10 gauge.

MILLING MACHINES

Cincinnati #3 Vertical Milling Machine, High Power, Power Rapid Traverse. Motor Drive.
Ohio No. 34 Heavy Universal Milling Machine, M.D
No. 1½ Valley City Plain Miller, belt drive.
PRATT & WHITNEY 2" Spline Duplex Miller.

Consolidated 216 Double Action 100 Ton Press



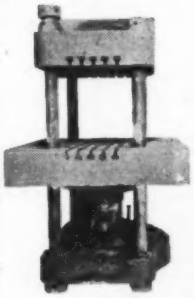
Consolidated No. 216 Double Acting, Cam Reducing Press, Straight Side, Tie Rod Construction, Plain Flywheel. Bolster area 28 x 26. Equipped with coil straightening rolls, roll feed, scrap cutter, stroke of plunger 5". Condition guaranteed first class. Price $2750.00 f.o.b. Rochester, New York. Available for immediate delivery.

PLANERS

POND 72" x 72" x 18' table; 2 heads on rail, 2 side heads.
CINCINNATI 30" x 30" x 10' table, M.D.
PUTNAM 48" x 48" x 12' table, M.D.

PROFILERS

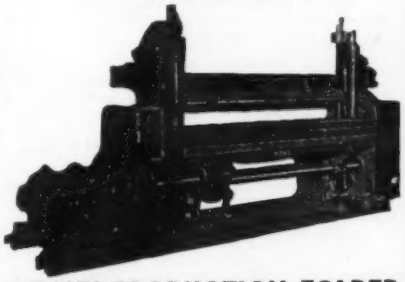
P. & W. No. 12 2-spindle motorized Profiler, Table 12" x 15" equip. with 6" rais. blocks, and 5 H.P., 3 ph. 60 cycle, 220 V. motor—Turner drive mounted and wired to push button control—rebuilt and guaranteed.



200 TON HYDRAULIC PRESS

American Car & Foundry upmoving ram; 4-column type; distance between columns 35" right to left, 24" front to back; daylight 34½"; minimum die space 22"; platens are made with 5 tee slots; bottom platen area 49" right to left, 36" front to back; cylinder 13⅛" diameter; 24" stroke; #500# pressure capacity.

NIAGARA #98



HEAVY PRODUCTION FOLDER

6' x 14 gauge capacity. Ar. M.D.
Working length 72", cap. 14 gauge; min. width of fold at cap. 1" gaging range (narrow folds) ¾" to 1½", max. gaging range 72" left of chamfering bar 3". Shipping wt. 12,690 lbs. Like new.

Presses, Brakes and Shears

Marietta Power Press 50 ton, 104 x 20 bed.
Bertsch Shear, 72" x 5/16.
Niagara #208 Circle Shear and Flanger.
No. 132 Bliss 14 ga. 18" throat slitter.
No. 232 Bliss 12 ga. 18" throat slitter.
100 ton Adriance Straight Side, Single Crank, Single Acting. Back Geared Power Press, 2" stroke. 18 x 18 bed area.
#21 Bliss O.B.I. Press, 2½ stroke.
#21 Bliss O.B.I. Press, 2" stroke.
#216 Consolidated Double Acting, Cam Drawing Press, straight side, tie rod, 5" stroke.
Truesdale #19, similar Bliss #19.
Baxendale No. 4 and No. 3, comparable Bliss #20 and #19 O.B.I.
Manville #4 Perforating Press with roll feeds.
Bliss #2 Back Flywheel 1½" stroke (8).
Niagara #25 Arch Press, 2½" stroke.
Bliss #30 Arch Press, 2½" stroke.
Rockford #2 O.B.I. Press, weight 1800#, 2" stroke.
Newbold Double Eccentric Back Geared Press, bed 48 x 20, 3½" stroke, shut 7¾", tons pressure capacity 200 tons, arranged motor drive with 10 H.P. motor 3-60-440 volt.

BENDING ROLLS

8' ⅝ cap. Pyramid Type Drop End Housing, Geared motor drive, 3 phase, 60 cycle, 440 volt.

15—6-SPINDLE AUTOMATICS—LIKE NEW

New Britain #61—1⅝" 6-spindle Automatics—3 equipped for bar work—12 equipped for second operation work. Machines are about 15 months old. Now available for immediate delivery. Equipment includes motors, chucks, collets, and tooling. Write, wire or phone Main 6347.

Buy From Stock

MACHINERY

FALK

MACHINERY CO.,

MERCHANTS

18 WARD ST.

Tel. Main 6347

ROCHESTER 5, N.Y.

KEEP 'EM RUNNING!

Every machine listed in this column is in our warehouse at press time.

•

53" N.B.P. Vertical Boring Mill

76" BULLARD Vertical Boring Mill, 2 swivel heads, M.D.

4⅝" Bar N.B.P. Horizontal Boring Mill, Knee Type, 30"x90" table, M.D.

42" PUTNAM Double End Car Wheel Lathe, M.D.

47" N.B.P. Double End Car Wheel Lathe, M.D.

No. 1 L. & A Multiple Punch, 100 tons, 72" between housings

6" x 6" x ⅝" Double Angle Shear.

Beam Shear 20", 60# and smaller.

60" Throat 8" x 1 1/16 Shear.

54" Throat 1¾" x 1⅛" Punch.

15" GLEASON Bevel Gear Generator.

30" x 30" x 10' NEWTON Slab Miller horizontal arbor, M.D.

36" Rotary Planer, M.D.

48" x 48" x 24" NBP Heavy Planer, Two Rail, One Side Head, Motor Drive.

48" x 48" x 20' PATCH Planer, 4 heads, 230 Volt D.C. Rev. Motor Drive.

36" x 36" x 8' GRAY Planer, 230 volt D. C. Reversing Motor Drive.

24" x 24" x 6' WHITCOMB Planer, 230 volt D.C. Reversing Motor Drive.

SIMMONS ENGINEERED Machine Tool REBUILDING

SIMMONS MACHINE TOOL CORP.

1759 North Broadway, Albany 1, N. Y.

N. Y. Office: 149 Broadway

. . . IN STOCK

AUTOMATICS

No. 00 Brown & Sharpe, single spindle
⅞" Model M Cleveland, four spindle
1¼" Gridley Model F, four spindle
1¾" Gridley Model F, four spindle
⅞" National Acme, No. 515, four spindle
4½" Cleveland, Mod. A, single spindle
5½" Cleveland, Model A, single spindle

BROACHES

HO American Hydraulic, Horizontal
XB10 Oilgear Hydraulic, Horizontal

DRILLS

24" Colburn, single spindle
Barnes Camelback, single spindle, tapping
No. 17 Foote Burt, 2 spindle
Avey Sensitive, 3 spindle
Leland-Gifford, Sensitive, P.F., 3 spindle
Barnes Camelback, 4 spindle, 2 tapping

GEAR CUTTERS

No. 12 Barber Colman
No. 6 Fellows Gear Shaper
No. 3 Brown & Sharpe Automatic
96" Gleason Gear Planer
15" Gleason Spiral Bevel Generator
No. 10 Lees-Bradner Gear Grinder
30" Rochester Gear Tooth Rounder

GRINDERS

No. 3 Cincinnati Centerless
No. 16 Blanchard, 26" chuck
22" x 48" Pratt & Whitney Vertical Spindle Surface, Timken Bearing
30" Diamond Face, 84" Table Travel
10" x 72" Brown & Sharpe Cylindrical
6" x 32" Norton Cylindrical
No. 1 Cincinnati Tool & Cutter
No. 70 Heald Internal

LATHES

18" x 8' Sebastian, q.h.
14" x 6', 18" x 8' Lodge & Shipley, c.d.
36" x 20' Boye & Emmes, q.h.
20" x 14' Hendey, c.d., yoke head
8" x 60" Fitchburg Lo-Swing, q.h.

TURRET LATHES

36" Bullard New Era Vertical, m.d.
12" Bullard Mult-Au-Matic, six spindle, m.d.
No. 4 Warner & Swasey Univ. q.h.
No. 2A Warner & Swasey, q.h.
18" Libby Universal, q.h.
21" Gisholt, Universal, c.d.

MILLS

No. 1½ Brown & Sharpe Univ. s.p.d.
No. 3 Ryerson-Conradson Plain, s.p.d.
No. 12 Brown & Sharpe, c.d.
No. 6 Whitney Hand, c.d.
No. 3 Knight Vertical, s.p.d.
No. 2 Kempsmith Vert. Maximiller, m.d.
No. 3 Brown & Sharpe Vertical, s.p.d.
Model C. Becker Vertical, s.p.d.
4" Pratt & Whitney Spline

MISCELLANEOUS

Curtis Oil Separator
Cochrane-Bly Die Filing Machine
10' x 16 Ga. Ohl Squaring Shear
No. 2 V & O Press, O.B.I.
No. P2 Ferracute Press
15 Ton Lucas Forcing Press, m.d.

PLANERS & SHAPERS

16" American Crank Shaper, s.p.d.
24" x 24" x 8' American Planer, m.d.
38" x 38" x 12' Niles Planer, m.d.
48"x 48" x 12' Cincinnati Planer, m.d.

RESTORE YOUR WORN MACHINES by having us rebuild them. We have a complete rebuilding department operated by men thoroughly trained in rebuilding. Your machines are taken down, carefully checked for wear, and worn parts are replaced, bearings and ways scraped and refitted. You'll find when rebuilt by us they'll perform like they did when they were new.

Write, Wire or Phone Us

INDIANAPOLIS MACHINERY & SUPPLY CO., INC.

1959-69 South Meridian Street

INDIANAPOLIS, INDIANA

Eastern Branch:

44 WHITEHALL STREET, NEW YORK, N. Y.

EASTERN OFFERS FROM STOCK

GRINDERS

Cincinnati Valve Seat Grinder, m.d., cap. ⅜" valve stems
No. 55, 60, 65 Heald Cylinder Grinders
No. 20 Gardner Comb. Disc Grinder and Roller Sander, m.d.
No. 6 Bryant Internal
No. 10 Bryant Internal
No. 20 Bryant Internal
No. 72 Heald Hydraulic Internal, with attachment for grinding tapers in spindles, 3 motor drive
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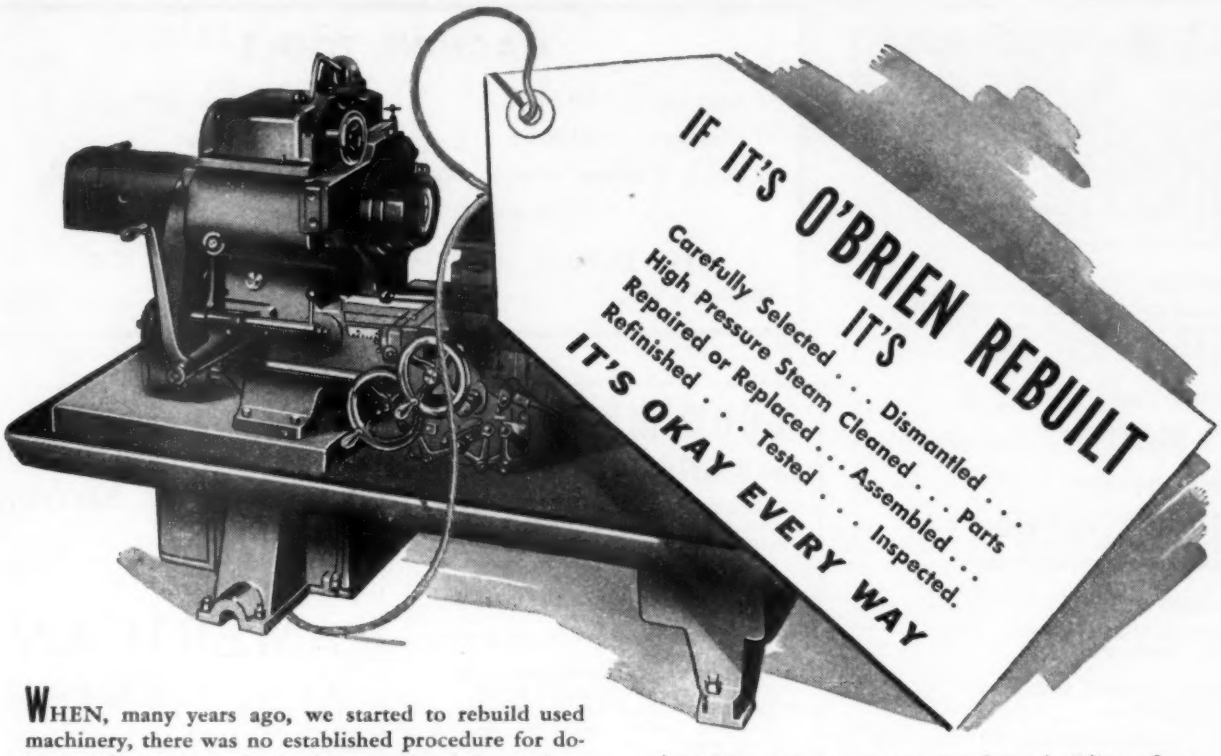
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Saws, Nos. 12, 14 & 17 Higley cold 4" to 8"
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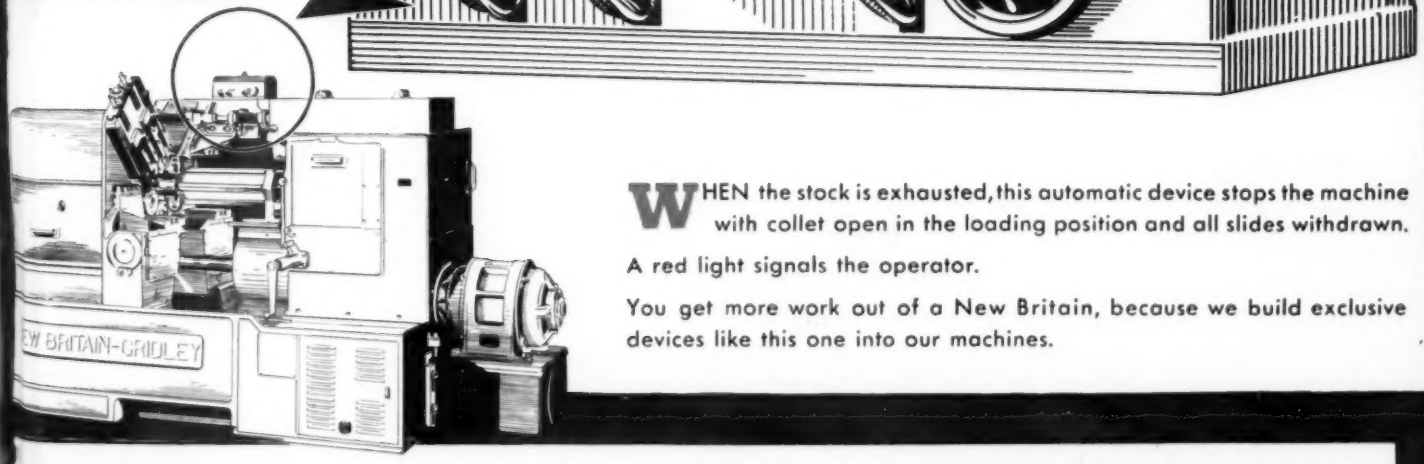

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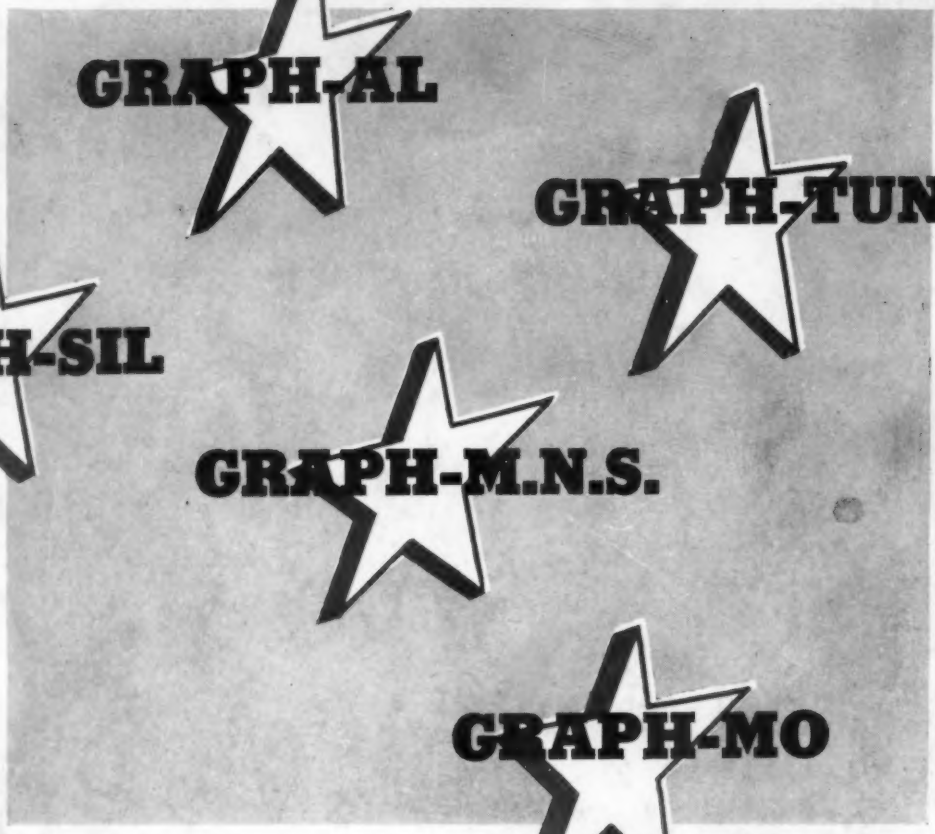

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